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COVERS ALL PHASES OF THE PRODUCTION AND MARKETING OF CRUDE RUBBER AND THE MANUFACTURE AND DISTRIBUTION OF RUBBER GOODS

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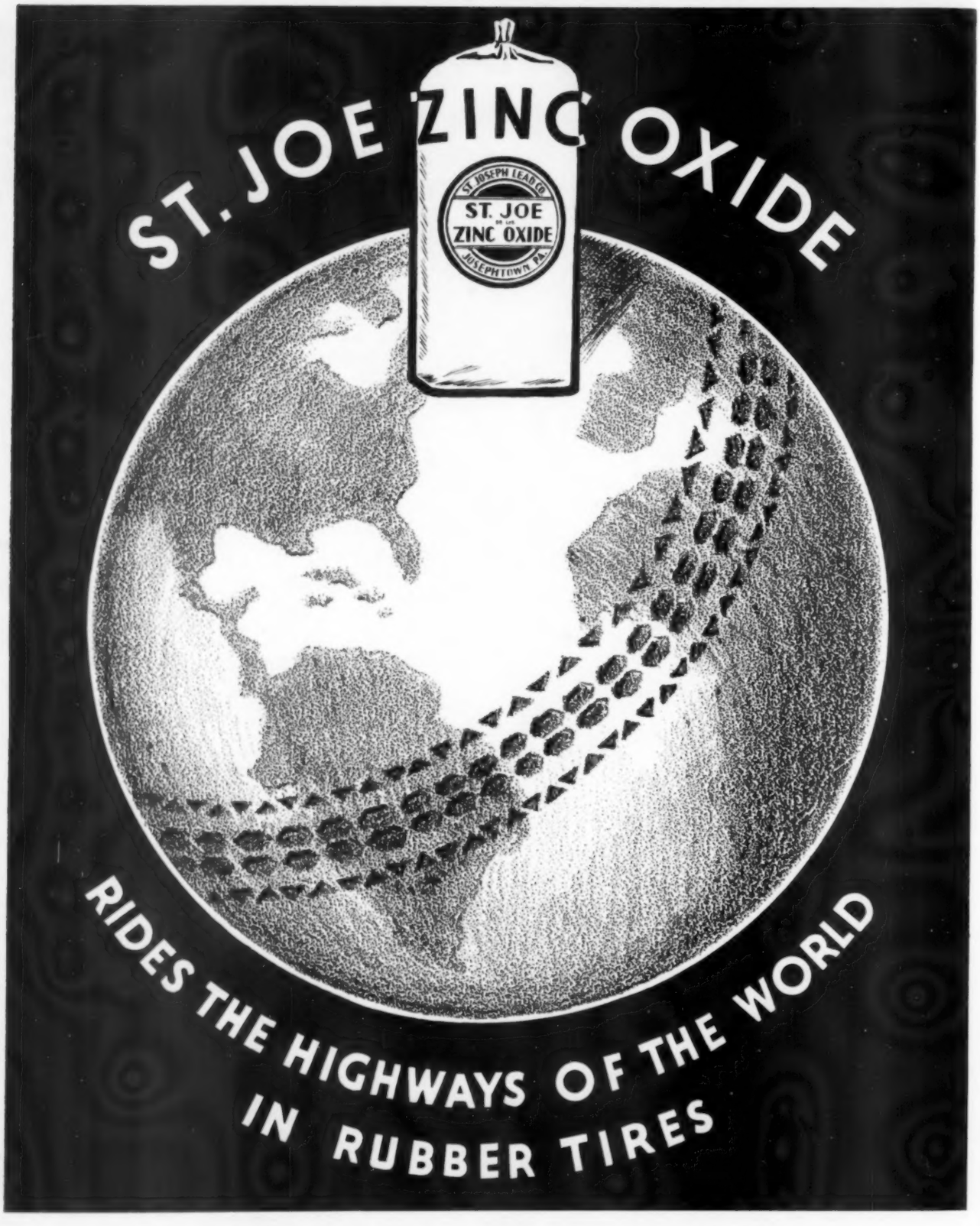

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Preservation of Latex

Stability of Latex Can Be Maintained Over a Prolonged Period of Time by Use of an Artificial Buffer Solution

By D. Spence

Jacques Loeb Laboratories, Pacific Grove, Calif.

WHILE the chemical and physical properties of latex have been very fully investigated during the course of the past thirty years, the biological aspects of this plant product have only now begun to attract the attention of the biochemist. As a result, in the scientific literature of today reference will be found only to such biological products and reactions as one would naturally expect from a product of this character. The approach to the fundamental biochemical questions involved in the handling and treatment of latex has just begun.

The tendency of *Hevea latex* to coagulate on heating or spontaneously on standing is now too well known to require more than mere mention here. Thus, heating was at one time employed in the Far East as a means to produce a coagulum which did not darken on drying and spontaneous coagulation was one of the earliest of methods employed to bring about the separation of rubber from natural latex dispersions.

Though the early experiments of Whitby, Campbell, Barrowcliff, Vernet, Eaton and others failed to conclusively show the part played by enzymes on the one hand and by bacteria on the other in the process of coagulation of *Hevea latex*, they did nevertheless demonstrate at an early date that the natural latex could not be heated much above 85°C. without partial or complete coagulation taking place; also that dilute latex so heated (pasteurized) still continued to develop further acidity on standing.

I think it may be safely asserted without fear of contradiction that inability to completely destroy both enzymes and bacteria and thus to effectively "sterilize" latex as a practical matter without bringing about its coagulation and decomposition, as demonstrated by those early workers, is the chief reason why the importance of the rôles of the natural enzymes in latex coagulation and of bacterial contamination of latex are today so imperfectly understood. So also it is that in the collection of latex and the subsequent storage and utilization of the same, the problem of its natural tendency to coagulate has remained a paramount practical difficulty to be overcome in its commercial development all along the line.

It is now generally accepted that the natural enzymes, and more particularly bacterial contamination of latex, contribute to its natural coagulation on standing or heating by bringing about, as in the case of fresh milk, the decomposition of products present in

the latex with the production of a gradually increasing acidity therein. From this the common practice has developed of adding to latex during collection and transport amounts of alkali sufficient to counteract the effects of these agencies and to maintain the latex in a constantly alkaline condition. Such treatment has recently been referred to as sterilization of the latex although this is, of course, obviously incorrect.

Ammonia Only Delays Coagulation

A vast number of reagents of alkaline, also of bactericidal character, have been suggested and patented for this purpose, but it is safe to say that the entire supply of latex available for commercial use today will be found to contain ammonia or its equivalent of some other common alkali in amount sufficient to prevent any possible subsequent development of an acid reaction in the latex. The addition of such reagents to natural latex has, however, merely delayed or lessened the natural tendency of fresh latex to decompose and coagulate without eliminating the cause for those chemical and physical changes which find their expression in the constantly changing properties of the final coagulum. It is well known that ammonia-preserved latex is still far from being what one would call a "stable article of commerce" and there are many practical difficulties in connection with its use. (*Vide*, "Latex"—Hauser, pp. 106-115, 1927).

The present situation has been admirably summed up by Rhodes of the Rubber Research Institute of Malaya in an address delivered before the Rubber Section of the American Chemical Society (1935) in connection with a Symposium on Crude Rubber Requirements, as follows:—

"When latex is won from a tree under practical conditions, it is contaminated by bacteria. This contamination cannot be prevented in practice. . . . The acidity which the bacteria produce causes premature coagulation in the field which can be prevented by the addition of small quantities of either sodium sulphite or ammonia. But the amounts in which they are used are not sufficient to kill the bacteria. *They do not sterilize the latex, and although the latex may appear to be satisfactory, the bacteria are still at work, producing decomposition in the latex constituents.* Varying degrees of bacterial contamination and activity from day to day can, therefore, make only for a further adventitious variability in latex composition."

Ammonia-preserved latex from which the excess alkali has been removed by dialysis under conditions where further bacterial contamination cannot possibly occur, soon becomes foul and coagulates. That the proteins and other by-products of the latex are involved in such decompositions has long been surmised, but we have recently shown that the rubber hydrocarbon itself is far from immune to the action of certain organisms isolated from ordinary garden soil and applied to sterile latex.

The gradual conversion of the so-called "sol-kautschuk" of latex to "gel" form and the complete breakdown of the complex molecule of rubber into water-soluble decomposition products may be cited as two remarkable results now well established in an almost unlimited chain of practical possibilities in connection with the action of bacteria of one form or another on latex dispersions. The results of such bacterial decompositions are made clearly apparent in latex incubated for ten days at 30°C. in the physical properties of the residual, dry rubber recovered therefrom.

In an effort to overcome the objectionable changes known to develop in ammonia-preserved latex and to produce a stable product, free from the practical difficulties resulting from the presence of alkali in latex, investigations have been carried out on the factors which affect the stability of *Hevea latex* from which the ammonia had been entirely replaced or removed by dialysis. Studies have also been made on fresh latex extracted from the cortical cells of living guayule plants.

In every case it was shown that the stability of the latex was largely dependent on its reserve buffer-strength and that by increasing this strength, by the use of an artificial buffer solution having the same pH as that of the fresh latex itself, the stability of the latex could be maintained over a prolonged period of time without coagulation taking place. Furthermore, it was found that fresh latex adequately buffered in this way could be heated to temperatures well above those employed in modern bacteriological practice without coagulation resulting. These fundamental observations paved the way for the sterilization of latex and for the development of a "permanently stable and neutral, sterile latex."

The variations which occur in the pH of fresh latex of the same species are but slight, and in the case of *Hevea latex* do not extend much beyond the range of substantial neutrality. Accordingly, a neutral buffer solution with a pH of 7.0 has been found to be satisfactory for *Hevea latex*, and it is a comparatively simple matter to determine the pH of the buffer solution and the amount thereof required for any particular latex. It has been found that a potassium phosphate buffer corresponding to the buffer normally present in fresh *Hevea latex* gives excellent results. In practice the corresponding sodium phosphate buffer may be substituted.

Thus a neutral buffer solution consisting of M/20 monobasic sodium phosphate and containing the requisite amount of M/20 sodium hydroxide to bring the pH of the final buffer solution to approximately 7.0 by determination is satisfactory for practical purposes. In the treatment and subsequent sterilization of latex prepared in this way it is important that the pH of the buffered latex, before and after sterilization, should remain unchanged, and it is necessary to use a buffer solution in sufficient amount of concentration to ensure this result.

To still further increase the stability of latex during sterilization, protective colloids and other stabilizing agents may be added in small quantity to the latex or to the buffer solution. These may be introduced, for example, in the normal preparation of the buffer solution which we use, in preference to water, to replace the normal serum of the latex in the purification and concentration of latex by centrifugal means.

Sterilization by Standard Methods

It has been found that latex treated in this way can be sterilized in sealed cans, drums or in other suitable receptacles, according to the standard methods recognized in bacteriological practice, without any evidence of coagulation taking place. Microscopical examination of the sterilized product indicates that the rubber globules or particles are still fully dispersed and in rapid Brownian movement. As a practical matter it is well that the container containing the latex should be filled to within 10% of its total capacity in order to avoid any possible frothing which may otherwise result in some slight coagulation of the latex on the upper wall of the container.

Latex treated in this way and sterilized by heating for 20 minutes at 120° C. under conditions where subsequent contamination cannot possibly occur remains

stable indefinitely. Samples of neutral, sterile latex prepared in this way in the Far East from fresh latex and in this country from preserved latex and latex concentrate in which the ammonia was replaced by a neutral phosphate buffer have remained uncoagulated and unchanged in physical and chemical properties as far as it is possible to determine by measurements upon the latex itself, and upon the rubber therefrom. Many of these samples of neutral, sterile latex are now more than two years old, their concentrations ranging from 20 to 50% dry rubber.

On account of the fact that the latex is heated in the complete absence of alkali for a comparatively short period of time and in the almost complete absence of air, it is not surprising to find that the rubber prepared one month or one year therefrom differs negligibly in physical and chemical properties from the product of the original latex itself. In contrast to the rubber prepared from latex of the same vintage, preserved by ammonia in the ordinary way, the rubber from this neutral, sterile latex is much more plastic and breaks down more readily on the mill. A neutral latex prepared in this way is more viscous than latex of the same concentration containing ammonia or alkali, a not unimportant factor for many purposes.

The coagulation of this neutral, sterile latex can be brought about by any of the means in current practice, except that where acid is employed less is required than in the case of ammonia-preserved latex, provided the minimum buffer requirements of the sterile latex have not been greatly exceeded. As the cost of the necessary buffer solution is less than that of the ammonia currently employed, the total cost of the treatment should not exceed present costs and, when all the figures are available on a production basis, may possibly show some advantage over existing practice.

Apart from the practical advantage of eliminating the changes which now take place in latex "between tree and factory," the production of a neutral, stable latex at once overcomes the disadvantages resulting from the use of alkali as a preservative for latex and the expense involved in the removal of the same in processes in which a neutral latex is essential.

The study of fresh latex need no longer be confined to laboratories in the Far East, and at long last fresh *Hevea latex* can be shipped to any part of the world for investigation and development. Neutral, sterile latex in sealed containers can be kept indefinitely without fear of decomposition or change in quality. It has made possible for the first time a systematic study of the effect of enzymes and bacteria on latex, some of the results of which have been briefly referred to here.

We have also found that many reactions involving the rubber hydrocarbon can be carried out with neutral latex which do not occur, at least to the same extent, if the latex is acid or alkaline. In studying the role of the rubber in the living plant this observation is undoubtedly of importance; the observation would also seem to fit in with the long-established art in rubber compounding.

Rubber from Poinsettia Serum

THAT crude rubber equal to plantation rubber in most respects and superior in many respects can be secured from a special variety of poinsettia is the claim made in a recent patent (U. S. P. 2,133,040) granted to Herman E. Pitman of St. Louis, Missouri. The patent specifically relates to a method of extracting rubber from the serum of this plant.

Contains High Percentage of Latex

According to the patent, a variety of poinsettia which produces a serum containing a high percentage of latex has been discovered in Guerrero, Mexico. The plant is in abundance and reaches an average maximum height of from 6 to 8 feet, the leaves being approximately 5 inches wide and 8 inches long at maturity, while the stalk grows to a maximum diameter of approximately 1⅛ inches. With these exceptions, it is said to be quite similar to the multitude of varieties of poinsettia which grow in the southern part of the United States. For the lack of a better name, the Mexican variety has been called the large-leaf Guerrero poinsettia.

The patentee claims that experiments have demonstrated that the serum of the Guerrero poinsettia contains from 60 to 67% of recoverable latex. Because the serum quickly becomes rancid after extraction and exposure to air, thus destroying the latex, it is necessary to preserve it by adding some preservative, such as a solution containing commercial ammonia, which prevents coagulation. After the preservative has been added, the serum is thoroughly agitated for several minutes in a suitable container, following which it may be stored in tanks or put in shipping containers for delivery to a coagulating plant.

Although the preserved serum may be coagulated by any of the well-known methods used for ordinary latex, the patentee states that he prefers to use a coagulant solution consisting of three parts, by volume, of acetic acid, and one to two parts, by volume, of formic acid. After this solution is mixed with the serum, the serum is slowly agitated until all of the latex coagulates into a plastic mass of uniform consistency. The coagulated mass is then fed through smooth squeezing rolls to remove and reclaim the excess chemical solution, and then, after being reduced to sheet form by the rolls, is fed continuously through a cracking washer having three herringbone rolls, with sprays of warm water being discharged on the sheets as they pass through these rolls.

After the sheets are thoroughly ground by the washing rolls and the remaining chemicals are removed, the rubber is then passed through corrugated sheeting rolls to convert it into final sheet form. It is then hung up to dry for a period of from 5 to 7 days, after which it is said to be ready for the market as commercial crude rubber.

Greater Tearing Resistance Claimed

According to the patentee, crude rubber produced from the serum of the Guerrero poinsettia has greater tensile strength, elasticity and elongation than rubber obtained from Hevea trees or other commercial sources. Tests of representative samples of vulcanized rubber are said to have shown that rubber made by the described process has 17% greater tearing resistance than that of rubber made from first latex. Mr. Pitman makes the claim that the Guerrero poinsettia can be cultivated and grown at relatively low cost and that the actual cost of producing the crude rubber in quantity would be less than five cents per pound.

1939 Automobile Show

Annual Exposition Reveals Decided Trend Toward Latex Foam Seat Cushions and Other Increased Uses of Rubber

THE 1939 National Automobile Show, sponsored by the Automobile Manufacturers Association, opened at the Grand Central Palace in New York City on Armistice Day, November 11, and will continue until Friday, November 18. Eighteen makes of passenger cars and nine makes of commercial vehicles are on display, as well as approximately fifty exhibits of accessories. The slogan for this year's exposition is "Automobiles for America's Progress."

Special Attention Given to Comfort

Generally speaking, improvements in springs, body roll and sideway controlling devices, steering stabilization, and new shock absorber applications are among the more important contributions to easier riding noted in the new models at the Exposition. Improvements in seating, with higher seats, more flat floors and new cushioning methods also contribute to increased comfort. Rubber, of course, plays an important role in the latter respect.

From the rubber industry's standpoint, the big automotive development in the 1939 models is the gradual adoption of latex foam seating. In the van of this movement are Hudson and Nash. "Airfoam" seat cushions are standard equipment on Hudson's entire Country Club series and all convertible models, and optional in Hudson 112 and Hudson Six cars. "Airfoam" is the latex sponge material developed by Goodyear and introduced a few months ago. In the manufacture of this material, the individual bubbles in the latex are not sealed up, but intercommunicate in such a way that the air flows about through the cushion as it rises and falls during movement. The surface of the cushion is perforated so that the air can flow through it as freely as through a fabric, thus air cooling and ventilating the cushion.

Hudson is widely advertising the statement that the new "Airfoam" cushion, in combination with its new Auto-Poise system of chassis stabilization, "provides a maximum degree of comfort, safety and sense of security under any and all road conditions." Auto-Poise control is said to afford complete control over the action of the front wheels and suspension system under conditions which in the past have tended to affect the stability of the front end. This applies particularly to heavy side gusts of wind, certain conditions of road surface, or differences in tire inflation in the left and right front tires.

The new Nash models, too, show a great improvement in seat design, with more coil springs and padding used to provide a more comfortable ride, with soft rubber cushions offered as a built-in standard feature on the Ambassador Eight cars. Soft rubber cushioning is also available as optional equipment on all other Nash models. In addition to Hudson and Nash several other manufacturers, including Chrysler, De Soto, Dodge and Plymouth, are using strips of the new latex sponge rubber on top of the backs of front seats as a safety measure to protect rear-seat riders in sudden stops.

Airfoam seat cushion and spring design used on Hudson's entire Country Club series and all convertible models.

Rubber manufacturers have been quick to point out that the unit-molded construction of the new rubber seats materially reduces the number of items to be assembled and inventoried, *i.e.*, there is just the seat and the cover—broadcloth, mohair or leather—as against the conventional assortment of coil springs, webbing and hair-and-moss pads. The increased comfort and cleanliness (latex foam rubber is vermin-proof) afforded by these rubber seats also makes possible the exploitation of new selling claims, it is pointed out.

Other Various Uses of Rubber

Visits to the various exhibits at the Show also revealed a number of other uses of rubber. For instance, included among several mechanical improvements in the new Lincoln-Zephyr is a new rubber-cushioned body mounting which insulates the body against road noises transmitted through the running gear. This is provided by joining the ends of the front and rear cross members of the frame to the side rails with solid bonded rubber blocks. These two cross members are attached directly to the springs so that road shocks are intercepted by the four rubber mountings which support the body. A new rear engine mounting, more rigid rear axle differential housing, and a heavier torque tube carried in a rubber bushing prevent other noises from reaching the passengers.

Buick has also progressed in its attempt to further suppress road and other noises. The new models use a larger amount of rubber, rubberized fabric and special sound-deadening compounds containing rubber,

all placed at strategic positions. Engine mountings on all series of these cars have been completely redesigned to avoid metal-to-metal contact between power plant and frame. The "High Plane Hotchkiss Drive" principle has been applied to the 1939 Cadillac and La Salle models, in which rubber bushings are applied on the inner ends of the lower control arms of the front-wheel suspension. This is said to reduce friction, provide softer riding qualities and to eliminate the need for lubrication at all four points.

The new Chevrolet ride is said to be "flatter" on any road and at any speed than previously possible, according to the company's engineers. Contributing to this feature is a drop forged four-bearing crankshaft which has been improved by a new design harmonic balancer, floated in soft rubber for additional quietness. The balancer is said to smooth out any residual vibrations, and to remain fully tuned without attention. Chevrolet's ride stabilizer, a rubber-insulated round steel bar which functions like a torsion bar, is another factor in the smoother ride. Rubber pedal pads are now furnished as standard equipment on all Chevrolet models.

Trucks on exhibit at the Exposition also show increased uses of rubber. The new Reo and Studebaker trucks have adopted latex foam rubber cushioning for the seats, while it was learned that General Motors will supply these cushions as optional equipment on its complete truck series. Chevrolet and Mack trucks are using another type of latex material, *i.e.*, "Nukraft," the sheet material made by Goodrich out of upholsterer's hair in a springy figure-8 pattern impregnated with latex. This material is furnished the automobile manufacturers in ¾-inch thick sheets and is used to replace the conventional hair-and-moss which goes over coil springs. Tests have indicated that "Nukraft" will last as long as any other upholstery material in common use, if not longer.

From the consumer point of view, the 1939 models at the Show are more successful than any in the past in suggesting motion without revealing working parts, the mechanism now being completely attired. Placement of the radiator grills to suit the general aspects of the design removes the last of the mechanical parts from a visible exterior position. Lamps are now more closely blended into the contours of the car than ever before, while bodies are wider. Running boards are contracted in several of the new models, which means a loss to the mechanical rubber goods industry in that fewer or smaller running board mats are called for. The trend toward a solidified whole, however, has received greater emphasis in the 1939 automobiles.

Tire Tractor No-Skids

AN entirely new principle is said to be employed in the design of a new device intended for use on tires to permit safe winter driving by affording positive control on ice, sleet, snow and wet highways. Made by the Tire Tractor Corporation, Upper Darby, Penna., the new device is called "No-Skids." Rubber and fabric cleats, made of tire material, fit snugly against tire tread and wall. Into these cleats metal discs are securely fastened, and borium studs are welded onto the discs. The borium studs bite into ice and snow and prevent skids, slips and swerves, according to the manufacturer. The cleats are affixed to the wheels of the car by means of chains. The chains never touch the ground, their sole purpose being to hold the cleats firmly in place without play or sag. An adjustable locking device holds the chain tightly in position.

Rubber in Textile Finishing

IT has recently been shown that rubber may be deposited electrically on textile fabrics in a similar manner to metals, a species of electro-plating. Dispersions of sulfur and pigments are also negatively charged and so may be deposited along with the rubber to form coherent homogeneous layers and these may then be vulcanized. This process is covered in U. S. Patent 1,476,374.

More recent work by Blow and the Wool Industries Research Association has resulted in the discovery that textile fibers may be given a positive electrical charge by treatment with certain quaternary ammonium salts containing fatty residues, such as cetyl pyridinium or dodecyl trimethylammonium bromide. The use of these soaps in the rubber finishing of textiles is reviewed by Julian Warwick in a recent issue of the *Textile Colorist*, from which the following is abstracted:

Wool in the form of tops is treated with a 2 per cent on its weight of cetyl pyridinium bromide dissolved in water to give a 10 per cent solution. It is then dried and formed into roving. Hanks weighing half an ounce each are wetted with dilute sodium carbonate solution, centrifuged and while still damp entered into 250 cc. of rubber latex dispersion. (The alkali dip increases the electro-negativity of the wool fiber).

Cannot Be Removed by Washing

The hank is now gently moved about in the rubber mixture for 5 to 10 minutes, during which time the rubber to all intents and purposes behaves like a dye and attaches itself to the fiber leaving a clear, "exhausted" liquor. The attachment of the rubber to the oppositely charged fiber is part electrical attraction, but in addition, the fatty residue in the quaternary soap "dissolves" in the rubber making the bond even stronger. When so rubbered, the rubber cannot be removed again simply by washing, just as dyes are not simply reversible on fibers for which they possess affinity.

The treated hanks may next be centrifuged dried and heated to 70° C. for 90 minutes to vulcanize the rubber. The rubber mixture is made up as follows and may contain a colored pigment. Rubber (dry weight) 100 parts, zinc oxide 3 parts, sulfur 2 parts, accelerator and anti-oxidant 1 part of each, dispersing and stabilizing agent 0.5 parts and pigment dyestuff 2 parts. The aqueous portion comprises 99.75 per cent of the whole and is made alkaline with ammonia.

The effect of this process is to color the wool yarn and make it stronger without impairing the handle, air permeability and other physical qualities. Increased resistance to wear and water-repellency are said to be achieved. Yarn of 1/12's counts acquires a tensile strength of 20 to 24 ounces whereas untreated fibers have a strength of only 6 to 8 ounces. Instead of endowing the fiber with a positive charge by treating it with a quaternary soap, it may be possible to avoid this stage in the process by giving rubber latex a positive charge by treatment with such a soap, in which case fabrics may be treated direct in one simple dipping process.

Were any articles published on the surface treatment of rubber during 1936? The answer to this and similar questions, with all data given as to original sources, will be found in the "Bibliography of Rubber Literature for 1936"—part of the 1937 RUBBER RED BOOK. Paper-bound copies, $2.00; cloth-bound, $3.00.

The Social Aspects of International Rubber Regulation

Problems of Restriction Must Embrace All Indirectly Involved Factors If It Is to Be a Complete Success

By E. G. Holt

Chief, Leather & Rubber Division,
Bureau of Foreign & Domestic Commerce

THE problems of any individual company engross its executives, and this is true of the leaders of each group of companies performing similar functions, and likewise of each entire industry consisting of many groups performing varied services. In each case, and increasingly as larger groups and more important ramifications are involved, the problems tend to merge with those of national and international economic and social character, and the executives find themselves dealing with and forced to consider many matters not directly pertaining to the industry itself. If problems of international rubber regulation are treated as though they involve merely the welfare of rubber producers and manufacturers, and other factors indirectly involved are ignored, history will record this international cooperative effort as one failing in its larger opportunities.

Post-War Idea of Economies

The present international regulation of rubber production could from the following point of view be regarded as stemming from the post-war idea of controlled economies as much as from the conditions of over-production and low prices within the industry itself. With a background of state controlled economies in Soviet Russia and Italy, the (British) Balfour Committee in 1929, writing its conclusions after a comprehensive survey of the British economic situation with particular reference to competition in international trade stated in part:

"We think it is abundantly clear from our survey that the first step towards putting British industries in a position to compete successfully in overseas markets is to subject their organization and equipment to a thorough process of reconditioning. To carry through this process successfully, two prerequisites must be fulfilled: (a) There must be an active will to reorganize based on real insight into the changing conditions and needs of the national and international economic situation; (b) There must be the power to reorganize, based on adequate means of access to the financial and technical resources necessary for material equipment, together with the whole-hearted cooperation of all the human factors to insure that the best results shall be obtained from the transformation."

Under (a) it was stated that "there must be a change in the attitude of the average business man toward new ideas." Under (b) the Committee was "profoundly convinced that the first steps . . . must come from the industries themselves . . . without reliance upon any outside authority." It was added that "full advantages of reorganization and reconditioning can be reaped only if employees are looked on as partners."

A report submitted by a minority of the Balfour Committee used somewhat different terms in its conclusions which included the following statements: "Elsewhere a rapid and general transformation in economic organization and industrial structure is going on, largely assisted by reciprocal action on the part of the state, on a scale and at a rate which, when 1929 conditions are compared with those of prewar, or even of 10 years ago, constitute a revolution. . . . The essential change consists in a fresh application of collective methods of organization and control. Moreover, at bottom it is a change not only of mechanics but of motive.

"The keys to the new order are not competition, individual acquisitiveness, or self-seeking, but coordination, science and service. . . . To us those facts indicate . . . the progress of a change going on in social and economic organizations—a change from a predominantly individualistic to a predominantly social type. Insofar as our country accepts and acts on the principal of rapid, conscious and planned adaptation of its productive and distributive apparatus to this new social type, it can recover. . . . That adaptation, however, involves a planned and coordinated use of the community's resources, such as can only take place under the direction of the state."

Avoid Internal Reorganization

Rubber regulation might then be regarded as a part of the British attempt to reorganize, involving cooperation which was gained from most of the other countries participating in world rubber production. Incidentally, tin and tea control may be considered parts of the same general movement. In a broad sense, the objectives of rubber regulation appear to emphasize the realization of a satisfactory price for rubber with definite steps toward the modernization of rubber estates. Internal reorganization of the producing industry has not been attempted by the International Committee. Support is given to scientific agriculture and the development of new uses of rubber through promotion and research.

These rubber measures represent a mode of organization tending to support the existing business structure in the producing industry. Particularly in the

British areas of rubber production, the internal administration of rubber regulation has benefited capitalized companies more than small-holders; while this was also originally the case in the Netherlands East Indies, the tendency there has been in the direction of equalized benefits to both capitalized companies and native producers. And in the matter of price policy indicated by the effect of the decisions rendered by the central regulatory authority, the direction of events clearly shows that a price is aimed at which will be satisfactorily remunerative to capitalized companies.

Industry Survived Bitter Period

The rubber producing industry has survived a bitter period (August, 1931 to May, 1933) during which the average monthly price for standard grades never rose to 6 cents a pound, while for 1931, 1932 and 1933 respectively, the daily closing New York prices averaged 6.12c, 3.43c, and 5.90c. From this past experience it is clear that, at 8c to 10c a pound for example, the world would (in absence of enforced restriction of output) be supplied with all the rubber needed for many years. There is plenty of evidence that efficient estates earned regular profits and paid dividends with rubber near 12c a pound, in 1934 and 1935, and during that period, as well as earlier, members of the producing industry were often quoted to the effect that a price of 8 pence (16c) a pound was their ultimate hope. Firms with experience in rubber production know that any average estate will nowadays earn money at this figure, and that the more efficient producers will pay excellent dividends.

But as a result of the remark by Sir Shenton Thomas about a price level of 9 pence to 10 pence, and the decisions of the International Committee after the 8 pence level was exceeded in late 1936, rubber trading circles the world over give credence to an idea that a minimum price of 9 pence (18c) is probably a definite objective of the regulation. They also know that the reduced volume of supplies necessary to make this price effective may again result in a speculative situation that temporarily at least might cause prices to go considerably above the 18 cent level.

This possibility is offset to some extent by a belief that the International Committee will in future guard against such wide price fluctuations—that they will not permit recurrence of the price movements of late 1936 and 1937—that this may be avoided by increased cooperation between rubber producing and rubber manufacturing interests.

The manufacturing industry is concerned over the whip-lash effect of a rise and fall in its chief raw material. Traditionally, price increases on finished goods lag behind the price rise in rubber on a rising market, while on the subsequent decline competition forces price reductions on products which involve inventory losses, as well as losses on rebates to customers or through cancelled orders by distributors. The larger companies usually have an advantage in a rising rubber market, while the smaller firms usually gain ground in a declining market—the larger firms usually maintain longer inventories, and the smaller ones usually buy more from hand-to-mouth. It is to be expected that the instability induced by wide price fluctuation is a matter of concern to the central administrative authority.

There are of course considerations, influencing the decision of an international governmental body controlling production of an essential commodity, aside from the desire of satisfying so far as possible the producers, the middlemen, and the manufacturers. The desirability of making production profitable enough to be capable of paying taxes is one such consideration. The long-term interests of the producing industry is another essential consideration. The desire to discourage competition from other materials in the field that may be served by rubber is a third. The desire to encourage the application of rubber to new fields of service is a fourth. And all these matters, in final analysis, necessitate consideration not so much of the crude rubber producers and middlemen, and the manufacturers and distributors of rubber goods, as of the ultimate consumers of rubber products.

It is an old and true saying that the customer must be served. It has always seemed to this writer that whatever in the long run tends to serve the ultimate consumer most effectively is also for the best interest of all who participate in rendering the service. And it is precisely here that one finds it difficult to avoid a question whether the policy thus far followed under international rubber regulation is in the best interests of the trade itself.

The theory of fairly high prices brought about through enforced scarcity in order to render production profitable and capable of paying increased taxes, commissions, and transportation charges, will probably find more adherents among capitalized companies than among the laboring forces and the consumers, in the long run. Labor wants employment, and consumers want finished goods. The more goods sold to ultimate consumers—not merely in dollar value, but in terms of actual weight—the more employment by distributors, by manufacturers, and by producers of the raw materials. And producers, manufacturers and distributors can of course operate on a lower gross profit margin with a high volume of trade than with a low volume.

Success in lowering the cost of this commodity would be bound to increase its utility in the world. A sustained price as low as possible would tend to place finished rubber goods within the purchasing power of the maximum number of people, would reduce use of other less expensive materials that replace rubber at higher prices, and would encourage new applications of rubber in additional fields, besides being less liable to wide fluctuations.

Rubber as a commodity is in competition with all other commodities for its share of world consumers purchasing power. It is not an exhaustible resource, as metals are; its increased use would be to the continuing benefit of producers. Rubber is capable of making inroads on the provinces supplied by other commodities to the extent that it can accomplish equal or superior ends at a lower cost to the consumers. Individual contacts of this division state that the prices under international control have retarded development of new rubber uses.

Low Price Inhibits Development

To the extent that its field of application is enlarged, the present production areas would profit through increased employment and general social health, because rapidly increased production from any new sources cannot be expected with rubber as it can with annual crops like wheat, cotton and tobacco which can be readily grown over much wider areas than is at present devoted to their cultivation. And a low price would tend to inhibit the development of new sources of rubber in additional countries.

The fact that the commodity comes from a relatively compact area in the Middle East makes it capable of exploitation through international regulation, and

there must always exist an understandable temptation to take advantage of this circumstance. That this would be an unsound business policy, either short-term or long-term, is the opinion of many producers as well as consumers.

International rubber regulation affords an opportunity to demonstrate the results of "coordination, science and service" through international cooperation, to quote again from the Balfour Committee minority conclusions. The decisions of the International Rubber Regulation Committee, and their effect, ultimately will show what policy they are following. The interests of the ultimate consumers are distinctly within the scope of fundamental Committee considerations, and inextricably tied up with the welfare of labor engaged in production of rubber and manufacture of rubber goods throughout the world.

The hope that full advantage of its larger opportunity for service will be reflected in Committee decisions is one in which all factors concerned can join. The wider sphere is public service, and not merely satisfaction of trade factors.

Anhydrex AA-LL

THE two principal limitations to the life of rubber insulation for wires and cables are deterioration in electrical properties because of water absorption and deterioration in physical properties because of oxidation and heat aging. The first limitation is said to have been removed by a deproteinized rubber insulation made by the Simplex Wire & Cable Co., Cambridge, Mass., called Anhydrex AA-60 (see the January, 1935, issue of THE RUBBER AGE). The second limitation is now said to have been largely overcome by the recent development of a superaging, heat resisting type of rubber insulation which has been termed Anhydrex AA-LL.

The new insulation is described by Simplex as "a new, oil-base, 60% rubber insulation which retains the electrical superiority of Anyhdrex AA-60 and, in addition, has such high heat resistance that it will satisfy any of the existing specifications for superaging or heat resistant rubber insulation." In addition to its superaging and heat resistant characteristics, Anhydrex AA-LL is also said to have the following properties: low water absorption, electrical stability in water, high electrical properties, high physical stability, higher allowable conductor temperature, and to allow increased current carrying capacity.

Rubber Pipe for Sewage Use

PIPES of widely varying materials are used in sewage work for the disposal of garbage and other wastes. How well rubber pipe stands up for such use was recently related by Walter C. Munroe, chief engineer, Anne Arundel County Sanitary Commission, Maryland, in a paper on "Rubber Pipe for Special Uses," delivered at a meeting of the Maryland-Delaware Water and Sewerage Association. Mr. Munroe stated that a sewer pipe installation was made several years ago near Annapolis to carry sewage 150 feet offshore to afford better dilution and prevent accumulations along the shore line. Rubber pipe was used to avoid piling which would have been necessary with conventional piping. The installation was temporary, pending intercepting sewers. The interceptors being completed, the rubber pipe was recently taken up and after six years of service showed no visible evidence of deterioration. It is being salvaged for future use.

Casting Tile in Rubber Molds

A METHOD of manufacturing precast concrete floor slabs, floor tile and wall tile, in which use is made of rubber molds, has recently been developed by the Superior Cement Corporation, Portsmouth, Ohio. Licenses have already been granted to several concrete products manufacturers. The floor tile and wall tile are made in variegated or straight colors, and the slabs are similarly colored or made without colors if tile or other surfacing is to be superimposed on the slab floor. Wall and floor tile are manufactured in 6 x 6, 3 x 3, 4 x 4, 6 x 12, and 12 x 12 inch sizes, and the slabs, which are load bearing, are 24 inches square and 2 inches thick, with a 2 foot concrete joist spacing Wall tile thicknesses are 5/8th-inch, and floor tile 7/8th-inch.

All of these units are manufactured in rubber molds, the concrete being placed by vibration. Use of uniform, rubber molds is said to result in a glossy surface finish. The two-foot square molds for the manufacture of slabs are held in place by a wooden holder, while the smaller tile is made in multiples which fill a standard wooden holder or frame. The molds and facing material are both supplied by Superior to its licensees.

In manufacturing these flooring units, the desired mixture is applied in the bottom of the rubber mold by a trowel, the mold is then placed on a vibrating table, and later the units are cured by a combination of heat and moisture. In the curing process, the units are covered in their molds by a tarpaulin which also covers a section of the steam main from the steam boiler. A flow of live steam is released within the tarpaulin through a petcock. Curing is done overnight and the molds are stripped the following morning.

In order to make the molds available for frequent reuse, high early strength portland cement is used exclusively which results in a minimum of broken edges and corners. After stripping, the rubber molds are washed with ordinary soap and water and are then ready for re-use. The molds must be absolutely clean so that a smooth even tile surface can be secured. Care must also be taken not to expose them unduly to sunlight and heat in order to preserve the resiliency of the rubber.

Glycerine as a Rubber Lubricant

TO keep an automotive vehicle in good condition and to cut down maintenance costs, the application of lubricants to all parts of the car is of course essential. Lubricating the rubber bushings and other rubber parts involved in the operation of the vehicle when they develop squeaks is often a problem because oil and grease cannot be used due to their deteriorating effects on rubber. Recently, several commercial preparations, especially designed for use on these rubber parts, have been introduced.

In the event commercial products are not available, the Glycerine Producers Association of America recommends a simple mixture of two parts alcohol to one part of glycerine. This combination acts as a successful rubber lubricant, according to the Association, since the alcohol evaporates after the solution is applied by the usual oil-can method, leaving the glycerine which acts as the anti-friction agent.

In addition to its function as a lubricant, glycerine is also known to have a beneficial effect upon the rubber, maintaining it in its firm resilient condition and preventing excessive drying. Since glycerine is not miscible with gasoline, oil or grease, it also acts to protect the rubber parts from the action of these materials.

Manhattan's 45th Anniversary

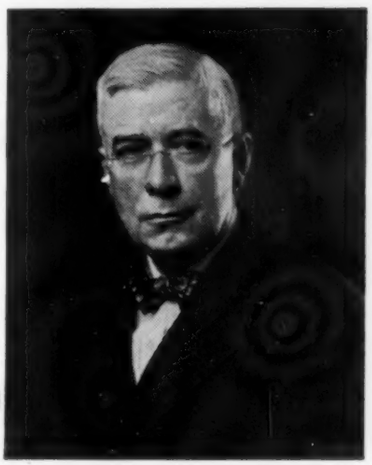
Founded in 1893 the Company Has Grown to One of the World's Largest Producers of Mechanical Rubber Goods

THE forty-fifth anniversary of the founding and incorporation of the Manhattan Rubber Manufacturing Company, now known as the Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., of Passaic, N. J., was observed on October 28. The event served to recall the interesting history of the company, now one of the world's largest manufacturers of mechanical rubber goods, a brief resume of which is presented herewith.

The original plans of the founders of the company called for a location in Paterson, N. J., as the Knickerbocker Rubber Company. These plans were changed when an offer was made to finance the first building if the plant were built in the neighboring city of Passaic. This offer was accepted and the company's name changed to the Manhattan Rubber Mfg. Company. Two months after the formation of the company, on January 1, 1894, manufacturing operations were started in one small building 50 by 150 feet with a crew of 40.

Mr. Frank Cazenove Jones, the first president, was responsible for the financing and planning of the company. He was forced to retire in 1903 because of ill health and was succeeded by Col. Arthur F. Townsend, who served as president for 26 years up to the merger in 1929 which formed Raybestos-Manhattan, Inc. Since 1929 Col. Townsend has been chairman of the board of Raybestos-Manhattan, Inc., and general manager of the Manhattan Division. Colonel Townsend also holds a prominent position in the rubber industry as the American member of the Advisory Panel of the International Rubber Regulation Committee.

Three other early executives of the company are still active. They are: Mr. F. L. Curtis, assistant general manager of the Manhattan Division and treasurer of Raybestos-Manhattan, Inc., who was manager of the company's original factory office; Mr. C. T. Young, factory manager, who was assistant to Mr. Curtis in the factory office; and Miss Margaret A. Hogan, secretary to Col. Townsend, who was Col. Townsend's secretary in the original main office in New York City and the company's first office employee. Mr. Henderson M. Green, now vice-president of Raybestos-Manhattan, Inc., became connected with the company later and has taken a prominent part in conducting its affairs.



Col. A. F. Townsend
Chairman of Manhattan Rubber's Directorate

Many of the products first manufactured by Manhattan in 1894 have become obsolete with the passing of time and the changing needs of industry. These included solid rubber buggy tires, clincher type bicycle tires, wagon springs, horseshoe pads, and early types of beer bottle stoppers. Other products which were among the varied group manufactured during the first year are extensively used today in a greatly developed and improved form. These products are rubber transmission belt, hose, molded goods, sundries, rubber matting and tiling, billiard table cushions, rubber-covered rolls and abrasive wheels. In addition to being a leader in the industrial rubber goods industry, Manhattan has also been an important factor in the automotive field and is now one of the largest manufacturers of brake linings and clutch facings for original equipment.

Manhattan was one of the pioneer American rubber manufacturers to grow plantation rubber. In 1910 the company sent a representative to the Far East in search of a crude rubber supply. As a result of his negotiations Manhattan opened up an extensive tract in the jungles of the Island of Java in the Netherlands East Indies. From this plantation Manhattan today obtains an increasing supply of its crude rubber.

Manhattan now employs approximately 3,000 persons in a plant that covers 800,000 square feet of floor space. Many of the company's employees have grown up with it. Twenty-four of them, a few of whom are original employees, started work in the factory or office before the turn of the century and are still active. Nearly 200 have seen twenty-five years of service or more. Manhattan's need for more manufacturing space has been filled by the establishment of auxiliary plants at Whippany, N. J., Neenah, Wisconsin, and North Charleston, South Carolina. The progress of the company is a tribute to the farsightedness of its founders.

Hevea trees on the Manhattan Plantation in the Far East which is approximately 78 miles southwest of Batavia.

Charles Goodyear

CONNECTICUT YANKEE AND RUBBER PIONEER

By P. W. Barker

CHAPTER IX

Charles Goodyear Obtains United States Patent for Vulcanization Process

AFTER Professor Benjamin Silliman, of Yale College, and other scientists had given their approval of the "heating" or vulcanization of rubber, Charles Goodyear began writing up his declaration and specification for patent. Dennis Kimberly, Justice of the Peace, New Haven, Conn., on December 6, 1841, administered the oath for *caveat* to be deposited in the United States Patent Office, until the inventor desired to make formal application for his patent.

Patent Granted June 15, 1844

Not before July 5, 1843, did Goodyear file formal application for the vulcanization patent. Thomas P. Jones, of New York, was the attorney; patent fee was $30. Patent Examiner was Charles G. Page, who received the application and specimens on January 15, 1844. And on June 15, 1844, U.S.P. 3633 was signed by John C. Calhoun as Secretary of State. Title was "Improvement in India-Rubber Fabrics."

Extensions or reissues of this famous patent were Reissues Nos. 156 and 157 of December 25, 1849, and Reissues Nos. 1084 and 1085 of November 20, 1860. Final expiration date was June 15, 1865. Reasons given for Goodyear's delay to 1843 before applying for patent were: (1) Lack of funds; (2) Search for substitute for sulfur in the process; (3) Desire to apply simultaneously for foreign patents.

Beaten in England and France

On May 30, 1844, Thomas Hancock obtained an English patent for a process almost identical with that of Charles Goodyear. Through an interpretation of the French patent law, Goodyear was to lose his rights also in that country, although his French patent of April 16, 1844, was the first publication, in any country, of the process and art of vulcanization. It must always have been a consolation to the inventor to have known that he did obtain a patent for his process in the United States. Further delay in application might have been serious, as witness this letter:

Patent Office, June 15, 1844

Horace H. Day,
Jersey City, Hudson Co., N. J.

Sir:—

Your application for Letters Patent, for an alleged improvement in preparing India rubber, has been examined, and rejected for want of novelty. An application for a patent for a similar process to yours was made on January last, by Charles Goodyear, of New York. For forms of withdrawal or appeal, see inclosed circular.

Respectfully yours,
H. L. ELLSWORTH,
(Commissioner of Patents)

If there be doubt in any mind that Charles Goodyear really understood the significance of his discovery at the time of his patent, let him read the October, 1844, circular issued by the inventor, under the title of "Vulcanization of India-Rubber—Facts in Relation to the Discovery of Charles Goodyear, in 1839." He lists eighteen characteristics of his "Metallic Gum Elastic Composition" and a great number of its applications.

Inventor Anticipated Applications

The charge is often made that even in his *Gum-Elastic*, written in 1851, Goodyear did not anticipate rubber's greatest use, that is, for tires. On page 279 of the second volume of his work, the inventor gives "Wheel-Barrow Tire" as an application for his rubber. His lack of interest probably was due to its use at an earlier date in England, which is stated. Goodyear was seeking undiscovered uses. His fairness in giving credit to others may be seen in his numerous footnotes. Even those who had injured him also received their credit line for suggestions of new uses for rubber.

Granted U.S.P. 3633, Charles Goodyear is again confronted with a problem. Shall he continue his chosen profession of invention, or shall he manufacture under the patent? Again the spirit of the Connecticut Yankee and Rubber Pioneer in this humble servant of God and benefactor of humanity urges him to continue his invention in an effort to discover all the possible applications for his vulcanized rubber. This decision was to prove disastrous.

NOTE: This biography of Goodyear started in our April, 1938, issue.

The Naugatuck India-Rubber Company, a joint stock corporation, was formed under the laws of Connecticut in 1844, on advice of Seth P. Staples. Henry Bateman Goodyear, brother of the inventor, was made superintendent of works, while Thomas Lewis was made president. As a protection from the merciless creditors who under the then existing laws might seize a debtor's person and all his possessions, Charles Goodyear, on July 18, 1844, transferred all his present and future patent rights to the friendly corporation for the consideration of $50,000.

Naugatuck Selected for Factory

Emory Rider and William C. De Forest were really the executive and financial heads of the corporation. An old building previously used as a button factory was obtained, and the manufacture of vulcanized rubber products began. Choice of Naugatuck as place of manufacture was motivated by sentiment and reason. Goodyear had lived in Naugatuck as a youth and his father's factory had been there; and the Naugatuck River afforded ample waterpower at low cost owing to its narrow width.

Blanket license was granted the new corporation to manufacture under the vulcanization patent. Should an application be received by Goodyear from another manufacturer for license, the Naugatuck company upon payment of a like sum to Goodyear could retain license for such a product. If the company did not wish to withhold license, written consent would be given the inventor to sell. In this manner, a number of rubber manufacturing companies came into being, their products bearing the mark "Goodyear's Patent."

Suspenders, shoes, elastics, and rubberized clothing were the first products manufactured by Naugatuck India-Rubber. Provision was made for Goodyear to conduct his experiments at the factory, and he spent much of his time there. Additional licenses, however, were sold when he required more funds for experimentation or for the immediate needs of his family. About $25,000 worth of goods were made during the first year of operation, but by use of a high degree of heat fully one-fourth was spoiled. This matter was easily remedied. Steam vulcanization was adopted in October, 1846, owing to the success of Henry Bateman Goodyear in June of the same year in curing $8,000 worth of rubberized tents in a strong wooden box. It was at this factory that sulfur was first omitted from rubber cement, difficulty having been experienced with cemented goods turning white at the seams.

Sale of Vulcanization Licenses

Probably the first license to manufacture under the vulcanization patent was acquired by Nathaniel Hayward on failure of Goodyear to pay him $1,000 for services under their agreement of April 3, 1841. This license was released by Hayward to Ralph B. Steele and Leverett Candee on August 22, 1843, and Hayward entered their employ for a few months. Charles Goodyear gave written confirmation of this license on August 31, 1843, for the manufacture of vulcanized rubber shoes. On September 5, 1843, L. Candee and Company, of New Haven, was organized, and on June 5, 1844, Charles Goodyear gave them a shoe license for 3 years. A joint stock company was formed in 1852, with a capitalization of $200,000, and in 1869 capitalization was increased to $300,000.

License to manufacture shoes was given to Samuel J. Lewis & Company on October 1, 1843, brother-in-law William C. De Forest having offered to finance the firm for $50,000. Others in the company, all related to Goodyear by marriage, were Samuel J. Lewis, Milo Lewis, and William H. Elliott. Production began in Naugatuck and the company later changed its name to Goodyear Metallic Rubber Shoe Company.

License was given to Josiah Tomlinson, who had married Goodyear's sister Harriet, for rubber clothing at Sandy Hook, Conn., and after failure in two years the company was succeeded by the New York Belting and Packing Company. Litchfield Rubber Company, Litchfield, Conn., was formed by Samuel J. Lewis, under license for rubber gloves. This company later changed its name to the Goodyear India Rubber Glove Manufacturing Company and moved to Naugatuck.

Hayward Takes a Goodyear License

Nathaniel Hayward began manufacturing shoes in a small way in Lisbon, Conn., under Goodyear license, in 1844, under the name of Nathaniel Hayward Company. In the spring of 1847 he sold out to a joint stock company and transferred his equipment to Colchester, Conn., retaining an interest in the new company which was named Hayward Rubber Company. Besides Hayward, there were Henry Burr and William A. Buckingham. In 1888 the company was reorganized and incorporated as the Colchester Rubber Company.

It will be seen that outside of offers to share in the profits, most of these licenses were granted in payment of debts or as assistance to relatives. Goodyear, however, did realize cash from the sale of his licenses to others. John H. Cheever, Henry Edwards, Charles McBurney and John Haskins purchased, for $2,000, on April 17, 1846, license for elastic bands. On March 28, 1847, license was sold to W. Rider & Brothers to manufacture rubber mail bags. These were the Riders who had assisted Goodyear in his time of need—William, Emory, and John. They had obtained a building in New York, on Fourth Avenue between 128th and 129th Streets. On July 1, 1848, they received another license from Goodyear, for the manufacture of army and navy equipment, druggists' goods, and sundry other articles.

Jonathan Trotter, of Brooklyn, N. Y., received a license on July 1, 1848, for the manufacture of army and navy equipment, druggists' goods, and sundry

WHOLESALE SHOE PRICES OF 1852

(Published by Goodyear Shoe Association)

	Per Pair
Men's shoes, of all kinds	$1.00
Men's footholds	0.75
Men's short boots, 16 inches	4.00
Men's short boots, above 16 inches	4.50
Men's top boots	5.00
Boys' shoes, size 6 and under	0.75
Ladies' shoes of all kinds	0.75
Ladies' gaiters of all kinds	1.00
Ladies' Jenny Lind buskins	0.75
Ladies' Jenny Lind boots	1.00
Ladies' long boots, felt lined	2.75
Ladies' long boots, net lined	2.00
Misses' and children's shoes	0.50
Misses' and children's gaiter boots	0.75
Misses' and children's long boots, felt lined	1.75
Misses' and children's long boots, net lined	1.625

(NOTE—It is not known what discounts were allowed)

other articles (an identical license to that of the Rider brothers). It might be of interest to record that Trotter was elected the first mayor of Brooklyn when it became a city.

Other licenses for the manufacture of shoes were sold in 1844 to Ford & Company, of New Brunswick, N. J. (name later changed to Meyer Rubber Company) and to the New Brunswick Rubber Company, of the same city. In 1848 Hayward Rubber Company, L. Candee & Company, Ford & Company, and Newark India-Rubber Company purchased exclusive rights to manufacture rubber boots and shoes, but the Goodyear Metallic Rubber Shoe Company and Onderdonk & Letson declined to purchase preferring a royalty basis of payment.

Form Goodyear Shoe Association

The Goodyear Shoe Association, composed of shoe licensees, was formed on July 1, 1848, and was a stabilizing influence in the rubber industry for many years, rigidly prosecuting infringers of the patents. Price regulation was one of the purposes of the Association. About this time license was sold to H. B. Ames, for rubber door springs, which he sold to Daniel Hodgman in 1851. In 1858 Goodyear sold Hodgman a license for a wide range of items.

It is impossible to enumerate the numerous license transactions for the vulcanization patent. Probably Goodyear himself did not remember all of them. He says, however, that by 1851 there were "some twenty establishments" operating under his licenses.

But the license which caused more difficulty than all the others was that for shirred goods. License for shirred goods was sold to David L. Suydam in 1844, for $15,000; but Horace H. Day began manufacturing the same goods with the result that Suydam surrendered his license. Goodyear entered suit against Day on several counts for infringement and asked damages, but Day settled out of court, accepting judgment in one suit and paying $5,000 damages. He promised to take exclusive license for shirred goods, hose and rubber beds and agreed to pay a royalty of 3 cents for each yard of shirred goods manufactured. Date of agreement was October 29, 1846, and license fee was to be $10,000. Sale of this license is mentioned in *Gum-Elastic*.

Shirred or corrugated goods were among the very first rubber products manufactured, made in the form of ribbons for suspenders, garters, and elastic straps for trousers and other clothing. It was considered at the time that Day could make about $250,000 profit annually from his license.

Day Secures His First Patent

Day's first U. S. Patent was that of October 12, 1844, for "Machine for Manufacturing Corrugated or Shirred India-Rubber Goods." This machine was sold to Day for $50 by the inventor, Amaziah S. Warner, at the suggestion of Horace Cutler. It had been originally made for Charles Goodyear in Springfield in 1842, but he had been unable to pay for it. A second machine was later made for him by Perkins & Osborn, Springfield machinists, under direction of its inventor. The willingness of Horace H. Day to patent the ideas of other minds, for it will be recalled that he tried to patent the vulcanization process, perhaps indicates the sharp business tactics of the man. Charles Goodyear should have been more wary in his dealings with Day.

(To Be Continued)

Another Use for Rubber Mountings

RUBBER mountings are being increasingly adapted for a growing number of commercial and industrial uses. Every once in a while these mountings are put to use outside of strictly commercial use, and a story often lies behind such applications. One of these stories, concerning a church bell and tradition, has just come to light.

A new building was planned recently for the Baptist Church at Fries, Virginia. The church owned and was

using a 1900-pound bell. The plans called for a tower of ample size to house the bell, but to build it heavy enough to withstand both the weight and the vibration would increase the construction cost considerably above the amount appropriated for the structure. It was decided, therefore, that the bell would have to be installed in the yard of the church rather than in the traditional bell tower.

After the new church was built, the architect was again approached by the congregation on the question of housing the bell in the tower. He refused to assume responsibility for this move, however, on the ground that while the supporting timbers of the tower were strong enough to hold the bell, the vibration created in ringing the bell would in time weaken the structure.

The answer to the problem was finally solved and tradition upheld when the bell was placed in the tower on rubber mountings after tests were made and indicated that all damaging vibration had been eliminated. Four No. 1 Vibro-Insulators, made by the B. F. Goodrich Co., Akron, were used. Each of these mountings can carry a maximum load of 500 pounds. As indicated by the circle in the accompanying illustration, one mounting was attached to each of the four legs of the bell frame.

To Owners of Noble's "Latex in Industry"

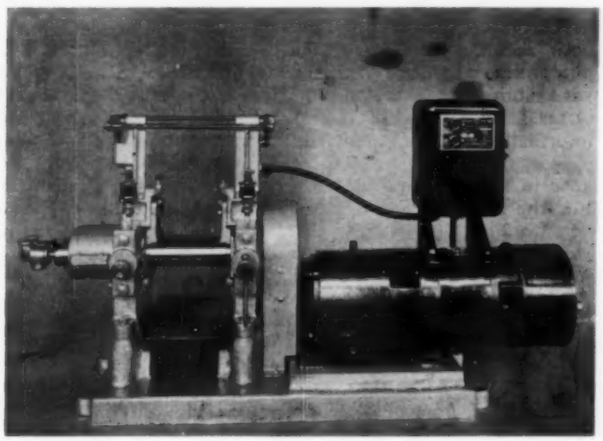
Purchased Prior to November, 1937

The author has prepared an addenda and errata list which represents not only errors in patent numbers and typography but which includes a number of references originally omitted from the book. This list, in printed form which may be readily pasted into the original copy, is available without cost. Address requests to THE RUBBER AGE, 250 West 57th Street, New York City.

New Equipment

Thropp Laboratory Mill

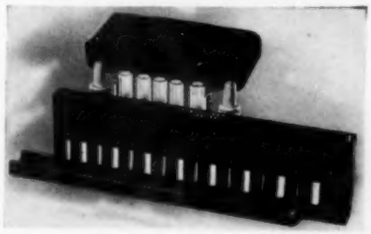
SAID to be the smallest of its kind, a new 2 x 6-inch laboratory mill has been introduced by Wm. R. Thropp & Sons Co., Trenton, N. J. Exactly the same in design and feature as the company's small 6 x 12-inch laboratory mill, even to being individually motor-driven, the new mill handles a minimum of 10 grams



of rubber and a maximum of 50 grams. Rubber broken down on the mill leaves enough room so that compounds can be satisfactorily mixed with the rubber. The machine is equipped with two hardened steel rolls, turned and ground true on the face and necks and hollow chambered to enable heating and cooling, whichever is desired. The back roll has a speed of 17.1 r.p.m., and the front roll 15 r.p.m. Stuffing boxes are of the improved steam engine type. Frames are semi-steel, with back boxes casted in them. The boxes are so designed that surplus oil is led off by means of a trough, keeping it from getting on the rolls or into the stock. Lubrication is effected by means of sight feed oil cups which pass through housings into the boxes. The bedplate, designed for placing the mill on bench or table, is cast of one-piece, holding mill and motor on it. Other features include: all gears are guarded; one-piece adjustable guides designed to prevent the stock from getting in back of them; steel mill pan; scrapers on the front and back rolls, easily removed for cleaning; and a ½ h.p., single-phase, 110/220 volt, 60 cycle planetary gear head motor, with motor mounted disc brake and magnetic switch having overload and under-voltage protection, completely wired. Thropp has also developed a 3 x 8-inch laboratory mill, with a 2 h.p. gear head motor.

Taylor pH Slide Comparator

DESIGNED for the colorimetric determination of pH, chlorine and phosphates, a new slide comparator has been developed by W. A. Taylor & Co., 872 Linden Avenue, Baltimore, Maryland. The weight of the new comparator, which is completely plastic molded, has been considerably reduced. All pH, chlorine and phosphate values, as well as the indicator names, are engraved in white on the slides. The entire outfit, including the slide, is 10 inches long, 2⅛ inches wide, and 4 inches high. It weighs only 1½ pounds, and consists of a slide and a base. Each slide contains 9 color standards alternating with ampoules of distilled water. The color standards will maintain their accuracy for at least five years, according to the manufacturer. The base contains 2 vials of indicator solution, with 0.5 cc pipettes, five 5 cc test tubes, and a piece of etched glass. In use, determinations are made by filling three of the test tubes with the test sample,



adding 0.5 cc of indicator solution to the middle one, placing the slide on the base, and moving it back and forth until the test sample matches one of the color standards. The pH, chlorine or phosphate value is then read off directly from the values on the slide. One base can be used with any number of color standard slides.

Saco Speed Reducers

A NEW line of constant speed reducers, to be sold under the trade-name of "Saco", has been added to the line of J.F.S. variable speed reducers manufactured by the Stephens-Adamson Manufacturing Co., Aurora, Illinois. The new speed reducers may be used with any standard, full-speed motor to give required output speed. The motor support is adjustable for V-belt drive, permitting sheaves to be replaced with ease to suit changes in required output speed. The shaft support construction of the Saco reducer is said to permit heavy over-hung load. Its range of output speed

varies from 13.2 to 172 r.p.m., while its efficiency is said to run from 89 to 93%. All shafts on the new instruments are mounted in ball bearings and the helical steel gears operate in a constant bath of oil. They may be used with any constant speed driven machine within their output speed range.

Book Reviews

Encyclopedie Technologique du Caoutchouc. Compiled under the direction of Andre Bloc and Georges Genin. Published by Revue Generale du Caoutchouc, 19, Boulevard Malesherbes, Paris, France. In two volumes. 1500 pp. 6¼ x 9½ in. 350 francs. In French only.

(Available from *Book Department*, THE RUBBER AGE)

Compiled under the direction of two of France's leading rubber technologists, this monumental work, the first of its kind to appear since publication of the "Encyclopedie du Caoutchouc" in 1929, published under the auspices of the Syndicat du Caoutchouc, covers the entire field of rubber from plantation through to finished rubber products. It is divided into five "books" or sections, three of them in the first volume and the balance in the second. Each section is subdivided into several chapters, each of which is devoted to some specific subject and written by a prominent technologist identified with that subject. Because of the importance of this work, we are presenting the contents of the two volumes herewith, together with the names of the various authors.

Volume I

(with an introduction by J. See)

BOOK I. PREPARATION AND PROPERTIES OF CRUDE RUBBER. History of Rubber (G. Genin); Production, Consumption and Prices of Rubber—the Restriction Plan and Future Outlook (G. Genin); Production of Rubber (V. Cayla); Variation in the Properties of Plantation Rubber (G. Martin); Rubber Extracted from Plants other than Hevea (L. G. Akobjanoff); Composition and Physical and Chemical Properties of Rubber and Other Elastic Substances (P. Bary); Changes which Occur During Vulcanization (P. Bary); and Gutta-Percha and Balata (J. N. Dean).

BOOK II. MODERN TREND OF THE RUBBER INDUSTRY. One Hundred Years of Progress in the Rubber Industry (P. Alexander); Composition and Properties of Latex (G. Genin); Direct Uses of Latex (G. Genin); Manufacture and Use of Powdered Rubber (B. D. Porritt and R. W. Parris); Preparation and Use of Plasticized Rubber (F. H. Cotton); Synthetic Rubbers and Rubber Substitutes (G. Genin); and Chemical Derivatives of Rubber (G. Genin).

BOOK III. CONTROL TESTS IN THE RUBBER INDUSTRY. Chemical Analysis—(a) Analysis of Raw Materials, (b) Analysis of Vulcanized Rubber, (c) Fluorescence, by P. Mensier; Physical Tests of Rubber—(a) Control during Manufacture, (b) Control and Testing of Finished Products, by A. T. McPherson.

Volume II

BOOK IV. PREPARATION OF COMPOUNDS. Preparation and Use (F. Truchet); Laboratory and Factory Equipment (F. Truchet); Radiovulcanization (H. Leduc); Use and Recovery of Volatile Solvents (G. Genin); Compounding Ingredients (F. Jacobs); Reclaimed Rubber (F. Kirchhof); and Factices (P. Alexander).

BOOK V. RUBBER PRODUCTS. Pneumatic Tires and Tubes and Solid Tires (J. E. Partenheimer); Rubberized Fabrics (A. Trepau); Conveyor and Transmission Belts (W. Esch); Rubber-Covered Hose (P. Mensier); Rubber in Roads and Paving (F. Jacobs); Flooring and Covering Materials for Buildings (F. Jacobs); Tennis and Golf Balls (S. G. Ball); Artificial Leather and Hides (Y. Cornie); Foam and Porous Rubber; Rubber Thread (R. G. James); Insulated Wire and Insulating Compounds (Domenach); Hard Rubber (Simonin); Bonding of Rubber-to-Metal (Simonin).

Can Closures (F. Jacobs); Rubber Sheet (F. Jacobs); Tennis Shoes and Sandals (J. Panem); Dental Rubber (R. Agrapart); Adhesives and Cements (L. G. Akobjanoff); Paints (H. P. Stevens and S. C. Stokes); Gas Masks (J. Audy); Erasers (W. Esch); Surgical Adhesive Tapes and Plasters (A. Trepau); Seamless Rubber Goods (G. Cany); Packings (W. Esch); Brake Lining (G. Cany); Abrasive Grinding Wheels (H. E. Howard and P. Arnould); Rubber in the Printing Industry (F. Jacobs); and Fireproofing of Rubber (F. Jacobs).

The value of this encyclopaedia to the rubber industry can best be appreciated by a study of its contents and by the calibre of the technologists contributing to it. The current work has more than one thousand tables, diagrams and illustrations, and is complete to author and subject indexes. Unfortunately, its distribution will be somewhat limited since it appears only in French, and it is to be hoped that some day this all-embracing review of developments in the industry will have an English edition.

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A.S.T.M. Standards on Textile Materials. Published by American Society for Testing Materials, 260 S. Broad St., Philadelphia, Penna. 6 x 9 in. 330 pp. $2.00.

Fifty-two specifications, test methods, and definitions covering a large number of textile materials are included in this latest annual compilation prepared by A.S.T.M. Committee D-13 on Textile Materials. In addition, there is a psychrometric table for relative humidity which combines both accuracy and convenience, a section comprising 43 photomicrographs of common textile fibers, a convenient yarn number conversion table, and a glossary of textile terms. Several proposed test methods are also given for information and comment, as are abstracts of ten technical papers presented at meetings of Committee D-13 during the year in symposiums on testing methods and on finishing. For the first time, standards covering colored fabrics (fastness to light), single-ply bleached broadcloth, spun rayon yarns and threads, and other materials are included.

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Chemical Engineering Catalog—1938. (23rd Edition). Reinhold Publishing Corp., 330 W. 42nd St., New York City. 8 x 11 in. 1034 pp.

The growth in the number of pages in the "Chemical Engineering Catalog" continues with this twenty-third annual edition. All previous sections have been continued, with the text pages completely revised and brought up-to-date. These sections include: Alphabetical Index, Trade Name Index, Equipment and Supplies, Chemicals and Raw Materials, and Technical and Scientific Books Section. Sixteen pages are devoted to the publication of certain useful nomographs and charts supplied by various commercial firms and educational and research institutions as an experiment in the direction of increasing the usefulness of the Catalog. An increased number of chemical and machinery company catalogs are included in this latest edition.

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Handbook of Industrial Fabrics. (Second Edition). By George B. Haven. Published by Wellington Sears Co., 65 Worth St., New York City. 5½ x 8 in. 742 pp. $2.00.

Like the first issue, published in 1935, this latest edition clarifies and extends general information relative to the physical properties of a number of industrial fabrics, including several types pertinent to the rubber field. The section devoted to A.S.T.M. specifications has been completely revised to gibe with recent revisions. An explanatory chapter on logarithms, slide rules and nomographic charts has been added in order to place these labor saving devices at the service of textile engineers. Numerous tables have also been inserted in the latest edition to render transformations in weights and measures easier and more direct. Every rubber manufacturer using industrial fabrics should have a copy of this book.

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Chemical Tables from Handbook of Chemistry and Physics. Compiled under the supervision of Charles D. Hodgman. Published by Chemical Rubber Publishing Co., 1900 W. 112th St., Cleveland, Ohio. 5 x 7¼ in. 1400 pp. $2.50.

All of the tables published in the "Handbook of Chemistry and Physics," brought completely up-to-date, are included in this new book, as well as many new ones. These include mathematical tables, general chemical tables, data on heat, light and electricity, etc. Location of data is facilitated by four divisional guides, each of which indicates the contents in the particular section it precedes. In addition, there is a complete cross index. The chemical tables, many of which are needed daily in technical laboratories, were prepared in collaboration with approximately 150 scientific authorities.

Booklets, Catalogs, etc.

Functions of the Sales Executive. Policyholders Service Bureau, Metropolitan Life Insurance Co., New York City. 5¼ x 8 in. 62 pp.

The results of a study of the sales practices and experiences of 120 manufacturing organizations are incorporated in this booklet. The scope of the sales management function is discussed under four general divisions: (a) the sales program, (b) the product, (c) the market and other "outside" factors, and (d) the sales organization. Case studies are given in one section of the report, while another section analyzes the way in which the sales manager spends his time. Other sections deal with the assignment and delegation of functions within the sales department, the nature and amount of field work done by sales executives, and the coordination of sales with other phases of the business.

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Gastex-Zinc Oxide Combinations in Shock Ply Type Compounds. (Laboratory Report No. 146). General Atlas Carbon Co., 60 Wall St., New York City. 9 x 12 in.

The physical properties of various compounds of the shock ply type in which partial substitutions of Gastex are made for zinc oxide are compared with a high Gastex and a high channel black stock in this report. The data given indicates that considerable increase in modulus from high zinc can be obtained by substituting Gastex for zinc oxide before an appreciable effect on heat built-up is noted. Six compounds in all were studied. A chart showing the percent increase in modulus (at 400%) as compared to the increase in heat build-up accompanies the report.

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Buyer's Guidebook of the Chemical Industry. (14th Edition). Chemical Industries, 149 Temple St., New Haven, Conn. 8½ x 11½ in. 624 pp.

Issued as Volume 43, No. 5 of "Chemical Industries," this 14th annual edition of the "Guidebook" has been completely revised and brought up-to-date. In addition, two new sections have been added—a Specialties Buying Guide and a Trade Name Index. The revised sections include a Table of Back Prices of Chemicals (1933-37), Trade and Technical Associations, a Geographical List of Chemical Manufacturers, Importers, Distributors, etc., Raw Materials Buying Guide, and Chemical Buying Guide. As in previous editions, it is a well put-together directory of the chemical industry.

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Hoffman Heavy-Duty Vacuum Cleaners. United States Hoffman Machinery Corp., 105 Fourth Ave., New York City. 8½ x 11 in. 8 pp.

Practical working information for adapting vacuum cleaning to many varied industrial uses, as well as descriptions and illustrations of the company's portable vacuum cleaners, is given in this catalog. Copy deals briefly with the nature of dust hazards, practical considerations involved in planning a dust removal system, requirements of industrial service in terms of the exacting demand upon equipment, etc.

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Gastex Football Guide—1938. General Atlas Carbon Co., 60 Wall St., New York City. 4¼ x 6 in. 64 pp.

This is the fourth edition of Grantland Rice's football schedule sponsored by General Atlas. In addition to listing the schedules of the leading colleges and universities throughout the country, there is also a short article by Mr. Rice and explanations of favorite plays by leading football coaches.

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Safety Clothing Catalog. American Optical Co., Southbridge, Mass. 7¾ x 10½ in. 28 pp.

Protective clothing, gloves, sleevelets, leggings, aprons, hats, hoods, and other types of safety clothing are described and illustrated in this catalog. The company recently added these products to their line of safety goods, and the new and complete line is covered in the catalog.

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Neville Resins. Neville Company, Neville Island, Pittsburgh, Penna. 6 x 9 in. 64 pp.

This latest revised edition of the Neville catalog includes data on several distinctly new types of resins which have been produced to meet industry's demands for thermoplastics for various applications since the first edition of this pamphlet was introduced four years ago. Properties, specifications, and uses of these new resins, as well as the complete line of resins featured by the company, are given in this edition. An interesting section of the catalog is that which shows the miscellaneous uses of Neville resins by industry. They may be used in eighteen different rubber products, according to the compilation.

•

The Preservation of Business Records. Business Historical Society, Baker Library, Soldiers Field, Boston, Mass. 6 x 9 in. 48 pp.

This pamphlet supplies the answers to the following four questions: (1) Why should business records be preserved?, (2) What material should be selected for preservation?, (3) How should records be preserved?, and (4) When should preservation be undertaken? It indicates how intelligent sampling of forms can obviate the necessity of storing all records, yet meet the needs of business. It also sets up a schedule which can be put into effect economically by most firms to preserve important records. The pamphlet, of course, is of special interest to office managers.

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Neoprene Type G. By N. L. Catton and D. F. Fraser. (Laboratory Report No. 38-9). Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 6¼ x 9¼ in. 14 pp.

This report contains an explanation of what Neoprene Type G is, and lists those properties which are superior to, and those which are equal to, Neoprene Type E. Data is also furnished on the compounding principles, processing and properties of this latest polymerized chloroprene rubber, with summaries of physical test data given on several compounds containing it. When properly compounded and cured, Neoprene Type G stocks are said to possess characteristics which make them desirable for many applications where neoprene has not heretofore been used.

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Adsco Rotary Condensation Meter. (Bulletin No. 35-80A). American District Steam Company, North Tonawanda, N. Y. 8¾ x 11 in. 12 pp.

This bulletin explains how to meter steam accurately in the form of condensate. It illustrates and describes the company's rotary condensation meter, and gives details of construction, operation, installations, etc. Several installation diagrams and photographs of actual industrial installations are also shown. A partial list of users of this equipment in the industrial, institutional and public utility fields is given.

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Eclipse Spray Equipment. (Catalog No. 66). Eclipse Air Brush Co., Inc., Newark, N. J. 8½x11 in. 32 pp.

The various types of spray equipment manufactured by the company, including accessories, are described and illustrated in this catalog. In addition, a pictorial section is included which contains views of Eclipse equipment in actual commercial use in various factories. Advantages of the company's equipment are detailed in all cases.

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Blaw-Knox Equipment for Industrial Proportioning. Blaw-Knox Co., Pittsburgh, Penna. 8½ x 11 in. 8 pp.

The various types of weighing and measuring devices, as well as steel storage bins, for granular and liquid materials for industrial and process plants made by Blaw-Knox, are described in this catalog. Illustrations indicate the use of this equipment in actual use. Schematic drawings are used to indicate proper installation.

Editorial Comment

Goodyear Memorial

A FITTING tribute to Charles Goodyear, discoverer of vulcanization and often called the "Father of the Rubber Manufacturing Industry," will be paid by the Goodyear Tire & Rubber Company in February of next year when it unveils a statue to the inventor. This statue, now being constructed by Walter Russell, one of this country's foremost sculptors, will be eight and one-half feet in height, and will be placed in a beautifully landscaped and terraced plot near the center of Akron, providing permission for the use of the ground is given by the Akron Planning Commission and City Council.

Erection of the statue by the Goodyear company next year is especially fitting in that the year of 1939 marks the 100th anniversary of the discovery that rubber and sulfur may be merged by heat. It is one of a number of memorial movements which will occur next year, culminating with a special program dedicated to the inventor during the 98th Meeting of the American Chemical Society to be held in Boston early in the Fall. No amount of praise will be sufficient to pay enough homage to the man who made possible America's billion dollar rubber industry.

The statue, of course, will also have special significance for the City of Akron. The pioneering efforts of Charles Goodyear paved the way for the city's emergence as the "rubber capital of the world." It will signify the Goodyear company's recognition of the city as its long-time home and as parent municipality of an organization that has grown to world-wide proportions. In addition, it will create a park of sylvan beauty in a district sorely in need of such beautification.

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Declining Exports

EXPORTS of rubber products from the United States have fallen off drastically in recent years. The total amount of such exports in 1937 was $32,084,374, as compared with the $85,436,897 exported in the peak year of 1920. Exports this year are not expected to exceed $27,000,000. This sharp reduction in exports is primarily due to the fact that decentralization of the rubber manufacturing industry is in reality a world-wide movement, accentuated in recent years by climbing tariff barriers and the drive of many countries toward a more intensive nationalism.

In order to retain part or all of their declining business in foreign countries, two courses are open to American rubber manufacturers: (1) Organize foreign subsidiaries and erect foreign factories; (2) Make an affiliation with an already organized foreign manufacturer. Since the first course requires the investment of considerable capital, the second is proving more popular with American manufacturers.

Recent affiliations between American and foreign manufacturers, whereby the foreign plants will produce American tires and other rubber products under the supervision of American chemists and engineers, include U. S. Rubber and the Cooperative Wholesale Society (of Sweden); Seiberling Rubber and the "Gentleman" S. A. (of Poland); and General Tire and Stomil, S. A. (of Poland).

Although either of the courses outlined followed by American manufacturers reduces the total amount of exports shipped from this country, and indirectly affects the working hours and wages of the American laborer, they are to be preferred to the direct loss of all foreign business caused by mounting spirits of nationalism.

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Quota for 1939

THE International Rubber Regulation Committee is scheduled to hold an important meeting on November 15, important in that it is expected to announce permissible quotas for the first quarter of 1939. The quota for the last six months of the current year was 45% of potential production capacity. Although American rubber manufacturers have expressed the opinion that the export quota should be raised to 55% next year in view of increasing consumption of rubber in this and other countries in recent months, it is generally known that the Regulation Committee still feels that world stocks are too high. In view of this feeling, plus the general knowledge that producers are still clamoring for 18-cent rubber, it is safe to predict that the Committee will hold to the 45% for the first quarter of next year. Should American consumption figures for October (which will be in the Committee's hands before the meeting) show an appreciable increase over September, then—and then only—is there a possibility that the quota might be advanced to 50%.

CURRENT • NEWS of the Rubber Industry

NOVEMBER, 1938

GAINS PREDICTED FOR RUBBER TRADE

Aided by a relatively well maintained replacement demand, shipments of pneumatic casings declined only 32% during the first nine months of 1938, according to the latest survey of the tire and rubber industry completed by the Poor's Publishing Company, publishers of "Poor's Industry and Investment Surveys." During that period, 52% fewer cars and trucks were produced than in the same months of 1937. Sales of mechanical goods, which were off 47% during the first half of the current year, improved considerably during the third quarter, the survey revealed, narrowing the nine months' spread from the previous year's levels.

The tire and rubber goods manufacturing industry definitely appears to be in the early stages of an upward income trend which should carry through most of 1939 at least, according to the survey, the findings of which were based on the following factors:

Examination of factors underlying demand for original equipment tires provides ample evidence that larger sales lie ahead. The automobile industry is offering an attractive new product at lower prices. Distress cars, both new and used, are virtually non-existent. And, more important, the improvement in economic conditions is broadening the potential market.

The outlined gains in employment and purchasing power forecast wider utilization of cars and trucks already on the road. This, naturally, will be reflected in a greater demand for replacement tires. Sales of mechanical rubber goods, closely related to the level of industrial activity, should be up sharply next year. In fact, gains recorded by this division will in all probability outstrip general recovery, for research is constantly finding new applications for rubber in industry.

The statistical position of both tires and crude rubber has improved vastly in the past twelve months or so. By intelligent adjustment of production schedules to a point somewhat under demand, tire manufacturers have gradually cut their inventories from a 3.4 months' supply at the end of 1937 to a 2.1 months' stock on July 31, 1938. Largely as a result of this action the industry was able to prevent a recurrence of the price wars which characterized the 1929-32 depression. Since July, inventories have been expanded somewhat; this trend will continue until the peak sales season requirements have been met.

That no unfavorable inventory adjustments need be made at the close of this year is almost a certainty. The unfavorable supply-demand relationship existing in crude rubber earlier this year is fast being rectified. It is estimated that the 45% shipment quota established by the International Rubber Regulation Committee for the current quarter, combined with a rising rate of absorption, will cut inventories of crude to a normal five or six months' supply by the end of December. Under these circumstances, price increases rather than declines are to be expected.

"Proceedings" Soon Available

Copies of the "Proceedings of the Rubber Technology Conference", in which will be included all of the papers delivered at the Rubber Technology Conference, held in London, England, on May 23-25, 1938, under the auspices of the Institution of the Rubber Industry, will be available for distribution in the United States on or about December 15. 105 papers in all, completely revised, together with the discussions which followed the presentation of each one, will be incorporated in the book. The book will sell in this country for $12.00 per copy, and can be secured from THE RUBBER AGE, 250 West 57th Street, New York City.

Holds Annual Convention

The National Association of Waste Material Dealers, Inc., held its annual convention on October 17 to 19 at the Hotel Sir Francis Drake in San Francisco. It was the first convention to be held by the industry on the Pacific Coast. Although several business sessions were held, the convention was largely devoted to social activities.

Auction Appleton Assets

Assets of the Appleton Rubber Company, Franklin, Mass., including machinery, equipment, raw materials, etc., were sold in piecemeal lots at a public auction held in Franklin on October 11. Ralph Rosen, Genesee Building, Buffalo, N. Y., was the auctioneer.

SAFETY SECTION MEETS IN CHICAGO

The Rubber Section of the National Safety Council held its annual meeting in the Stevens Hotel, Chicago, during the week of October 10, in conjunction with the Silver Jubilee Congress of the Council celebrating its twenty-fifth year of existence. The Rubber Section held sessions on Monday, October 10, and Wednesday, October 12. Tuesday, October 11, was "Rubber Section Day" at the exposition which is a feature of the annual meetings.

J. M. Kerrigan (U. S. Rubber Reclaiming), general chairman of the Section, opened the meeting on Monday afternoon, rendering the annual report. A paper on "Preventing Wind-Up Accidents," by R. S. Farnum (U. S. Rubber) was then given, followed by papers on "Disposing of Alleged Injuries," by R. W. Morse (Firestone) and "Using Watchmen and Janitors to Promote Safety," by J. T. Kidney (Goodyear). A round-table on "Rubber Mill Safety Problems," with short addresses by E. F. Foran (Goodyear), R. A. Bullock (Corduroy Rubber), W. H. McKay (Dunlop), and U. L. Moler (Inland Div., General Motors) finished the session.

After a paper on "The Nurse's Part in Getting Injured Employees Back on the Job," was given by Miss Margaret W. Lucal, of Ohio Rubber, at the Wednesday afternoon session, a round-table on "Specific Hazards in the Rubber Industry," including those pertaining to engineering, molding small rubber parts, calender and mill room problems, and hand tools, was held, with papers given by D. G. Welch (Hewitt Rubber), J. L. Grider (American Hard Rubber), W. W. Stephen (Goodyear), and H. A. Walker (Goodyear).

The following officers were named for the Rubber Section for the 1938-39 season at an election held at the beginning of the Wednesday afternoon session: *General Chairman,* R. A. Bullock (Corduroy Rubber); *Vice-Chairman in Charge of Programs,* R. W. Morse (Firestone); *Secretary,* Oliver Hopkins (Providence Plant, U. S. Rubber), and *News Letter Editor,* C. W. Ufford (Ohio Rubber). New chairmen of various committees were also appointed, as follows: *Engineering,* R. S. Farnum (Detroit Plant, U. S. Rubber); *Membership,* R. M. Weimer (Dayton Rubber); *Publicity,* John L. Grider (American Hard Rubber); and *Statistics,* R. Kastell (U. S. Rubber).

CONVENTION HELD BY DEALER ASSOCIATION

William J. Coughlin, of Indianapolis, was elected president, and M. U. Moseley, of Miami, vice-president, at the 1938 Convention of the National Association of Independent Tire Dealers, Inc., held at the Jung Hotel in New Orleans on October 10-12. Addresses by Congressman Wright Patman, Professor W. W. Leigh, and William D. Anderson featured the convention.

Among the more important resolutions adopted at the Convention were the following: That tire manufacturers be requested to keep records of all serial numbers on tires so that tires which come into unauthorized channels may be traced; that all seconds, blemished and discontinued tires be offered to established independent dealers only; that the National Bureau of Standards be requested to set specifications for various grades of tires and tubes; and that manufacturers post their resale prices on premium tires and tubes under the Fair Trade Laws.

Another important resolution called for emphatic protest against certain practices of petroleum companies with their leased service stations, as well as practices of tire manufacturers, which are allegedly in violation of the law, and asked the President of the United States to direct and command immediate action by the Federal Trade Commission to the end that such practices shall be immediately discontinued and suitable penalties imposed. These practices include cut prices, special discounts and rebates to large buyers.

Patman Flays Monopolies

Congressman Patman, who represents the First District of Texas, explained two of his pending anti-monopoly bills—H.R. 4722 and H.R. 9464—in his address. The first bill, which is aimed at divorcing manufacturing from retailing, has received several hearings and will be re-introduced to the next Congress. Refuting the claim that this bill if passed would be an unconstitutional law, the Congressman cited several legal decisions, with both inter-state and intra-state significance, which would seem to indicate that the Supreme Court would uphold the terms of the bill as constitutional.

Referring to H.R. 9464, which would restrict the operations of inter-state chain organizations to 500 stores in one state only, Congressman Patman stressed the point that this bill is not intended to destroy chain store concerns, but that it was rather intended to restrain their greed and to distribute privileges and opportunities. Should this bill become law, he said, the individual states would be in an excellent position to effectively deal with the chain store problem. He fully outlined the terms and purposes of this anti-monopoly measure.

Leigh Presents Figures

In his talk, given on October 11, Professor W. W. Leigh, who is head of the commerce department of the University of Akron and a recognized tire marketing expert, stated that despite the strenuous competition of chain stores, mail-order houses, petroleum companies marketing tires, and stores owned by the tire manufacturers, the independent tire dealer is holding his own and, as a group, still controls the bulk of the total annual tire and tube replacement market.

The speaker presented figures indicating that independent tire dealers sold 52% of all replacement tires last year, while oil companies sales amounted to 7.7% on private brand tires and 8.8% on standard brands, company-owned stores 10.8%, mail order sales 4%, chain stores 14.7%, and cooperatives and department stores 2%. These figures were compiled after a 7,500-mile research trip. The estimate was given that there are now approximately 90,000 oil outlets handling tires, and that this year oil company tire sales will exceed the 5,000,000 unit mark.

Concluding his talk, Professor Leigh declared that the tire industry needed a new program of price stabilization with narrower margins which would discourage the giving away of dealer discounts to customers. Referring to the retreading branch of the industry, he estimated that 4,250,000 tires would be retreaded or recapped in the United States this year, of which approximately half would be truck and bus tires.

Anderson Talks of Cords

William D. Anderson, president of the Bibb Manufacturing Co., Macon, Ga., was the concluding speaker on the three-day program. Discussing "Recent Developments in Tire Cord Fabrics and Heat Resistant Cord Versus Rayon," Mr. Anderson traced the history of tire fabrics and cord from the early use of Sea Island cotton, through the introduction of Egyptian cotton, on to the use of long staple cotton grown in the Mississippi Delta, and through to the invention of his company's "Heat Resistant Cord".

Mr. Anderson explained why "Heat Resistant Cord" deteriorates more slowly under continued high temperature than does ordinary tire cord, why no separation of the rubber from the cord occurs when tires made with the new cord are subjected to heavy duty, why the cord recovers from fatigue more quickly and completely than does conventional cord, and how its use retards and practically eliminates "growth" in a tire under service conditions.

Stating that he doubted very much whether any synthetic material, such as rayon, would ever replace cotton as a tire cord material, Mr. Anderson asserted "that size for size, diameter for diameter, and weight for weight, a cotton tire cord made of 1¼-inch cotton grown in the Mississippi Delta will have greater tensile strength than a rayon cord when both are in a normal state . . . and what is more important still, will be stronger than a rayon cord when both are reduced to a 'bone dry state', which is the state in which the cord performs in a tire."

In concluding his address, the Bibb executive stated: "Speaking out of my long experience in processing cotton, and from my knowledge of the tire industry and its requirements, I predict that no other fiber will ever successfully replace cotton in an automobile tire. No known fiber combines the remarkable tensile strength of cotton, with its flexibility, its resiliency, and its ability to stand punishment."

Coming Events

Nov. 11-18. National Automobile Show, Grand Central Palace, New York City.

Dec. 2. Boston Group, Rubber Division, A.C.S., Fox & Hounds Club, Boston, Mass.

Dec. 6. Los Angeles Group, Rubber Division, A.C.S., Mayfair Hotel, Los Angeles, Calif.

Dec. 16. New York Group, Rubber Division, A.C.S. (Xmas Party), Building Trades Club, New York City.

Dec. 26-28. American Physical Society, Annual Meeting, Washington, D. C.

Jan. 9-13. Annual Meeting, Society of Automotive Engineers, Detroit, Mich.

Jan. 20. Akron Group, Rubber Division, A.C.S., City Club, Akron, Ohio.

April 3-7. 97th Meeting, American Chemical Society, Baltimore, Md.

May 22-June 8. World Automotive Engineering Congress, auspices S.A.E., New York, Indianapolis, Detroit and San Francisco.

June 26-30. Annual Meeting, A.S.T.M., Chalfonte-Haddon Hall, Atlantic City.

Carbon Black Experiment

Since controlling the rate of flow of dustless black through the Banbury charging apparatus is an important function in proper rubber compounding, the Continental Carbon Company, suppliers of dustless black, recently built a replica of a customer's charging apparatus and conducted experiments on dustless black made under varying conditions and varying apparent density. By means of this approach, it has been possible for Continental to establish a specification for density and percentage of fines which permits the black to flow through the apparatus within the time desired. Information gained during this study demonstrated that the factors of density and percentage of fines must be taken into account in order to control the rate of flow desired through a given piece of charging apparatus, according to the company.

New Building for Carr

Carr Manufacturing Corp., Bristol, Rhode Island, has awarded a contract for the construction of a one-story wood and brick addition, 70 x 23 feet, to its plant. Increased business is said to have made the new addition necessary.

Sturdy IN TRANSIT
Fragile IN MILLING

BY the simple shearing action of the rubber mass Micronex Beads are reduced thoroughly and completely to their original minute particles suitable for incorporation into rubber. In this respect Micronex Beads are unique.

Such ease of dispersion is due to the patented process by which these beads are made—an exterior just strong enough to hold together the inside porous mass about two-thirds of which is air.

Despite this desirable friability, Micronex Beads are not too fragile. In transportation and in flow systems they exhibit a notable absence of dusting.

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COLUMBIAN CARBON CO.
MANUFACTURERS

RHODE ISLAND GROUP HOLDS FALL MEETING

The Rhode Island Rubber Club held its Fall Meeting on October 21 at the Pawtucket Golf Club, Pawtucket, R. I., with approximately 65 members and guests attending. Addresses by Robert A. Engel, Manager, Industrial Aromatics Division, Givaudan-Delawanna, Inc., and William Meyer, of the Charles T. Wilson Company, and the usual golf tournament, were highlights of the meeting.

During dinner, Chairman Charles Berlow (American Wringer) introduced Jack Marshall (Collyer Insulated Wire) who distributed prizes to winners in the golf tournament held earlier in the afternoon. The various events and winners of prizes follow:

Low Gross for Members—F. F. Salamon (Binney & Smith), Jack Marshall (Collyer Insulated Wire), and C. Whatmaugh (Respro); *Low Gross for Non-Members*—H. B. Simmons (Industrial Paper), and Len Yates (Industrial Paper); *Low Net for Members*—C. K. Mullen (Whittemore), and S. T. Lake (Respro); *Low Net for Non-Members*—W. McGowan (Respro); *Blind Bogey*—J. Christophers (A. Schulman, Inc.).

Harry Thompson (Anaconda Wire), who acted as chairman of the seasonal golf tournament for the Club, announced that the Wishnick-Tumpeer Trophy was won by the team representing Respro, Inc., which had earned 178½ points. Teams representing Anaconda Wire & Cable, Davol Rubber, and the "Peddlers," finished in that order behind the Respro team.

Meyer is First Speaker

Mr. William Meyer, who appeared in place of Alan L. Grant of the Wilson Company, was the first speaker. Discussing "Trading in Rubber," Mr. Grant told of the dangers of speculating in crude rubber and explained how speculation influenced prices of futures. He also explained that the crude rubber trade divided its business into markets, *i.e.*, the producer's market (in the Far East), the ownership market (in London and Amsterdam), and the consumer market (in New York), and pointed out where the dealer stood in each market.

Referring to the sensitivity of rubber prices to news, rumors, etc., the speaker indicated why this sensitivity was stronger in rubber than in other commodities. Before concluding his talk, he gave a hypothetical case which explained what would happen to the price and quality of crude rubber if the dealer was eliminated from the trading picture. After his address, Mr. Meyer answered questions from the floor.

The second paper, given by Robert A. Engel, was titled "Unusual Properties and Uses of Aromatic Chemicals." The speaker covered not only uses of aromatic chemicals in the rubber industry, but in the oil, paint and ink fields as well. He revealed that many essential oils had definite antioxidant and accelerator effects in rubber and other products and therefore the selection of the proper type for some specific use generally required a little research.

Rubber Mats for Cows

The latest innovation in dairy barn equipment is rubber mattresses cemented to the concrete floor. It has been determined that cows function better when kept on these moisture-proof, cold-proof, non-skid mattresses, which are about one inch thick, and which replace the usual straw bedding in stables. Much dust is also eliminated by use of the rubber mattresses. Cows lying on the mattresses are said to avoid udder trouble.

Mr. Engel also told of the early difficulties in getting rubber chemists to use aromatic chemicals, and explained a few of the tests undertaken to convince these chemists of the value of aromatics. He said that they were now used in a wide number of applications, including drug sundries, stationery goods, mechanical goods, reclaimed rubber and elastic fabrics. He also made brief mention of special aromatics developed for use with latex products.

Before the meeting adjourned, William Weller (Wishnick-Tumpeer) announced that a general course on rubber chemistry would be given at the Massachusetts Institute of Technology shortly. The course will consist of 16 lectures in all, to be given by Dr. Ernst A. Hauser, M. Omansky, and others. The cost of the course will be $8.00 for all sixteen lectures or $5.00 for eight.

Companies contributing to the prizes distributed at the meeting, including a few door prizes, follow: Baldwin-Southwark Corp., Stewart Bolling & Co., Godfrey L. Cabot, Inc., Fred S. Carver, Cleveland Liner & Mfg. Co., Colonial Beacon Oil Co., Continental Carbon Co., Farrel-Birmingham, Inc., Franklin Research Corp., General Atlas Carbon Co., Arnold Hoffman & Co., Landers-Segal Color Co., John D. Lewis, Inc., National-Erie Corp., Pequanoc Rubber Co., Sessions Gifford Co., Inc., Steel City Testing Labs., C. J. Tagliabue Mfg. Co., E. T. Trotter & Co., United Carbon Co., and Xylos Rubber Company.

Ontario Group Meets

A meeting of the Ontario Rubber Section of the Canadian Chemical Association was scheduled to be held in the Chemistry Building of the University of Toronto, on November 10. The meeting was to be addressed by Professor Joslyn Rogers of the University of Toronto on "Chemistry Before the Courts." Full details will appear in the next issue.

New York Xmas Party

The Annual Xmas Party of the New York Group, Rubber Division, A.C.S., will be held on Friday, December 16, at the Building Trades Club, 2 Park Avenue, New York City. Complete details will shortly be mailed to all members of the Group.

L. A. RUBBER GROUP HAS REGULAR MEETING

Several trade and educational talks featured the regular monthly supper meeting of the Los Angeles Group, Rubber Division, A.C.S., held on November 1 at the Mayfair Hotel in Los Angeles. During the business session, Ed Royal, chairman, named the members of the Nominating Committee, while the Membership Committee reported 16 new members, and the Golf Committee announced that a tournament will be held on Saturday, December 12, at the Flintridge Country Club.

Lee Horchitz, of the B. F. Goodrich Co., who has assisted in the development of unusual rubber products for the motion picture industry for the past several years, gave a detailed résumé of some of the problems encountered in this work. L. E. Clark, head of color research for the Dunning Film Process Co., an authority on the recording of sound and color on movie film, then gave a talk with visual demonstrations. The final speaker was Count Cutelli, world authority on the creation of sound effects for radio and motion pictures, who gave demonstrations of his methods, using an inflated, silk-lined rubber ball.

Several Prizes Awarded

Table favors, consisting of toothbrushes with the new synthetic bristles, were distributed by DuPont, through the courtesy of H. J. Jordan, while a "Sparklett" bottle with ten extra cartridges was given as a door prize by Martin, Hoyt & Milne, Inc., through Monty Montgomery, and a desk set was donated by the National Standard Company, through L. O. Smith, as a special prize. Music was furnished at the meeting by the Haywire Band, an organization whose members are all affiliated with the Southern California Automotive Jobbers and Manufacturers Association.

The next meeting of the Group will be held at the Mayfair Hotel on December 6, under the auspices of the Firestone Tire & Rubber Co. All features, prizes and table favors will be furnished by the company. Clyde E. Smith, Firestone factory manager, will preside at the meeting, while J. F. Moore, who is closely associated with Firestone's efforts in supplying tires for racing cars, will give a general talk on "Racing." An address on reclaimed rubber will also be given.

Chicago Group Meets

The Chicago Group, Rubber Division, A.C.S., was scheduled to hold its first Fall meeting on November 11 at the Hotel Sherman, Chicago. Dinner in the College Inn of the Sherman was to precede the meeting. Ernest R. Bridgwater, Manager, Rubber Chemicals Division, E. I. du Pont de Nemours & Company, was scheduled to deliver a paper on "The Evaluation of Synthetic Rubber-Like Materials." Full details will appear in our next issue.

GENERAL HEAD ASKS INCREASED QUOTAS

"America will need more rubber next year than British and Dutch producers are allowing it to have this year," said William O'Neil, president of the General Tire & Rubber Co., Akron, on October 17 on his return from Europe from a two-month business trip. "Greatly increased car production currently reported by nearly all of the motor car manufacturers will result in a need for increased imports of crude rubber during 1939, and I hope there will be an increase of 10% in the rubber quota for export from the Far East during the first quarter of next year," the General Tire executive stated.

Mr. O'Neil pointed out that not only are American manufacturers consuming more rubber than is being shipped in, but stocks of tires in manufacturers' hands have become depleted and must be replenished. He revealed that he carried abroad the hope that the quota for the last quarter of the current year would be increased from 45%, as in the third quarter, to 50%. Mr. O'Neil and A. L. Viles, president of the Rubber Manufacturers Association, acted as American delegates at the last meeting of the International Rubber Regulation Committee. The Committee, however, held to the 45% figure for the October-December period.

"Unless more rubber is received, the price of crude is likely to soar dangerously," Mr. O'Neil predicted. In this connection he said that while American manufacturers are satisfied to pay 8 or 9 pence (16 or 18 cents) a pound for crude rubber, a higher price than this is as much undesired as a reduction as low as 10 cents a pound, such as that which occurred last year. Joseph A. Andreoli, vice-president of the General Tire & Rubber Export Company, accompanied Mr. O'Neil on his trip.

5,000 Ford Tires Daily

The tire factory operated by the Ford Motor Company in Detroit is said to be turning out 5,000 tires daily and will reach 15,000 a day in the next few months, according to reports from Detroit. Normal peak production of Ford cars is 30,000 per week, and therefore when the tire plant reaches a production of 75,000 tires a week it will be supplying approximately half of the company's requirement for original equipment tires. It is understood that eventually Ford intends to distribute a good portion of the tires it produces through dealers as replacement equipment.

Revertex Corp. Moves

The Revertex Corporation of America has announced the removal of its offices, laboratory and compounding plant from 80 Broad Street, New York City, to One Main Street, Brooklyn, N. Y. All departments of the company have been consolidated in order to render more efficient service to customers. The new telephone number is TRiangle 5-7423.

To Erect Goodyear Statue

A monument to the memory of Charles Goodyear, discoverer of the vulcanization process, will be raised by the

Goodyear Tire & Rubber Company in the heart of Akron early next year to commemorate the 100th anniversary of the inventor's discovery. It is planned to erect the statue, which will be 8½ feet in height, in a beautifully landscaped and terraced plot, and to formally dedicate it on February 20 when sales and factory executives of the company throughout the world will be in Akron to celebrate the company's 40th anniversary. Walter Russell, famous sculptor, is now working on the statue in his New York studios.

Boston Meets December 2

A meeting of the Boston Group, Rubber Division, A.C.S., will be held on December 2 in Boston, probably at the Fox and Hounds Club, according to Dr. A. R. Lukens, secretary of the Group. This meeting was originally scheduled for November 4, but was moved up in order not to conflict with a meeting of the Rhode Island Rubber Club. Dr. Ernst A. Hauser is scheduled to speak on "Foreign Rubber Industries," while a second speaker will also appear. Election of Group officers will also take place at this meeting. Further details can be secured from Dr. Lukens, c/o Thompson, Weinman & Co., Inc., 11 Windsor Street, Cambridge, Mass.

Making "Royals" in Sweden

The Cooperative Wholesale Society of Sweden has announced that it has concluded arrangements with U. S. Rubber Products, Inc., under which "U. S. Royal" Tires for the Swedish market will now be produced in Sweden by the Society's factory in Gislaved. The daily output of the factory will be increased from 400 to 600 tires.

PLANS PROGRESSING FOR S.A.E. CONGRESS

Detailed plans for the technical sessions and other events of the World Automotive Engineering Congress, which will be held from May 22 to June 8, 1939, in New York, Indianapolis, Detroit and San Francisco, are shaping up rapidly, according to John A. C. Warner, secretary and general manager of the Society of Automotive Engineers, Inc., sponsors of the event. Henry Ford recently accepted the honorary chairmanship of the Society's advisory board of world automotive leaders, and praised the temporary plans.

The Congress will open for a five-day technical session and dinner in New York City on May 22, and American and overseas members will have an opportunity to see the New York World's Fair during their stay. It will then adjourn to Indianapolis, to see the Annual 500-Mile Sweepstakes on May 30, and will be entertained by the Indiana Section of the S.A.E. at a dinner. Then it moves on to Detroit where delegates will visit various automotive factories and will be given a dinner by the Detroit Section. The San Francisco three-day session will open on June 6 and visitors will have an opportunity to see the Golden Gate Exposition.

The technical sessions of this ambitious program will report engineering advances throughout the world in design, manufacture and operation of automobiles, aircraft, trucks, buses, and railcars, and fuel and lubrication refining. The program is in the hands of C. W. Spicer, president of the S.A.E.; Ralph Teeter, Chairman of the Meetings Committee; and committees representing the 10 professional activities of the Society.

Form New Rubber Group

The Rubber Proofers Association was recently formed in England, with such company charter members as the Ioco Rubber and Waterproofing Co., Frank Walters & Co., Ltd., A. O. Ferguson & Co., Ltd., and J. Mandleberg & Co., Ltd. T. J. Cragg, of the Mandleberg firm, has been named chairman, and A. Ryan, of Ioco Rubber, vice-chairman. While the new association will not incorporate price agreements, it will attempt to secure mutual support and cooperation in all matters affecting the rubber proofing trade, particularly in connection with the questions of wage rates and employment conditions.

Tire Prices Advanced

U. S. Rubber, Goodyear, Goodrich, General and other leading tire manufacturers announced increases of 2 to 5% on large-size special, bus and truck tires last month. These tires are generally known as "inactive tire sizes." No change was made, nor is any contemplated, in the price structure of popular size tires. The increase is the first, other than minor adjustments, made since October, 1937, when prices were generally raised from 2 to 6%.

JAPAN ENCOURAGES SYNTHETIC PROGRESS

A special fund for the encouragement of synthetic rubber production in Japan will be earmarked shortly by the Ministry of Commerce and Industry, according to reports from that country. The fund will be used to either establish a "national policy" corporation under government charter which would assist industrialists in research and factory problems; to purchase foreign patents in the name of the government with the government acting as a non-profit, patent-holding organization; or, finally, to provide subsidies and grants to commercial firms to recompense them for losses incurred in the manufacture of synthetic rubber by their own processes.

Crude rubber is one of the largest Japanese import items, approximately 60,000 metric tons being brought into the country every year. Although there are substitutes of Japanese make for balata and similar resins used for insulating purposes, no process for the production of a synthetic substitute for rubber on a commercial scale has yet materialized.

It is understood that the Japan Rubber Industrial Company has petitioned the government for permission to erect a 100,000-kilowatt power station near Karenko, Formosa, to produce synthetic rubber. Production at the proposed plant would be based on the process developed by the Umeno Research Institute. According to rumor, the Umeno process infringes on the DuPont method of producing neoprene.

Seiberling in Poland

Seiberling tires and tubes are now being manufactured in Poland by the firm of "Gentleman" S.A., in Lodz, also called the Anglo-Polish Rubber Manufacturers, under special arrangement with the Seiberling Rubber Company of Akron. Mr. Henry Walters, of the Seiberling company, is personally supervising operation of the special department for the production of the company's tires and tubes installed in the Lodz factory.

Starts Latex Department

The newly-created Latex Sponge Rubber Department of the B. F. Goodrich Co., Akron, is now in production. This department will produce a complete line of latex sponge rubber seat and back cushions, mattresses, and pads to the specifications of railroads, bus, truck and motor car manufacturers. All of these products will be marketed in conjunction with Nukraft, the company's latex-hair material.

Monarch Rubber Expands

Monarch Rubber Co., Hartville, Ohio, is building an addition to its plant. The new addition will be one-story high, of brick construction, and will measure 80 x 105 feet. The company's manufacturing equipment will be housed in the new building when completed.

Baldwin Loses Appeal

The decision of Judge O'Brien of the Detroit Federal District Court, in which he granted a judgment of $21,079 to the Paine & Williams Company, of Cleveland, against the Baldwin Rubber Company, Pontiac, Michigan, has been upheld by the Sixth Circuit Court of Appeals at Cincinnati. Judge O'Brien handed down his decision in January, 1937, and Baldwin appealed it. The suit involved claimed royalties by Paine & Williams under a license agreement with Baldwin. The total amount, with interest to date, is said to be approximately $23,000. Paine & Williams has two other patent suits in the courts against the Pontiac firm.

LOS ANGELES NEWS

F. L. Shew has been advanced from chief chemist to superintendent of the rubber division of the Darnell Corporation, Long Beach. He has been with the company for a number of years.

Charles Lamb, vice-president and general manager of the West American Rubber Company, reports the recent installation of several new pieces of equipment necessitated by increased demand for the company's oil field equipment.

D. & M. Machine Works, Torrance, is completing an addition to its plant which will provide an additional 15,000 square feet of floor space. The extra space will be devoted to increased production of garden hose, pistons, rods, liners, etc.

Arrowhead Rubber Company, headed by Carl Stentz, has put in a new mill and three presses. Harry Franklin, formerly with the Rubbercraft Corporation of California, has been added to the sales staff.

Kirkhill Rubber Company has completed the installation of a new 85 h.p. gas-fired boiler to supplant its 60 h.p. oil-fired boiler. The latter will be retained for emergency use.

Ed Royal, local representative of the H. M. Royal Company, spent two weeks in the East last month visiting the home office in Trenton, N. J., and various supply houses in New York City and vicinity.

T. Kirk Hill, president, Kirkhill Rubber Company, is completing the filming of a movie showing various processes used in his factory. When completed, the film will be shown at club luncheon meetings and other affairs in Los Angeles, while duplicates of it will be furnished to firms and individuals representing the company in other parts of the country for showing to customers. All of the filming is being done at night under artificial light.

CALIFORNIA GROUP HOLDS A MEETING

Approximately 25 members attended a meeting of the California Rubber Manufacturers' Association at the Clark Hotel in Los Angeles on October 27, the first to be called in more than a year. Charles N. Merralls, president of the Rubbercraft Corporation of California, and president of the Association, presided.

John R. Nygaard, of the National Association of Manufacturers, H. F. C. Duberg, of the Merchants and Manufacturers Association of Los Angeles, and C. R. Leslie, legislative counsel for the same group, addressed the meeting. Topics discussed were those of immediate interest to the rubber manufacturers assembled, such as recent and pending legislation and employer-employee relations.

The California Rubber Manufacturers' Association was organized about six years ago and in the past has always met at the call of its officers. An effort will be made, however, to hold regular meetings during the present season, with the next meeting to be held some time in December. Speakers with definite and practical themes of interest to the members of the Association will be invited to address each meeting.

Russian Tires Fail in Test

According to an International News Service report, emanating from Warsaw, Poland, tires made in factories in Russia from rubber abstracted from the *tau sagyz* and *kok sagyz* plants have failed miserably in tests. Practical tests were conducted on a fleet of twelve trucks. After one or two hundred miles the tires cracked and were no longer fit for use. Russian experts are reported to have claimed that the poor showing was due to faulty production methods rather than to the quality of rubber extracted from the plants which are indigenous to Russia. It is understood that an investigation for possible sabotage will be launched.

Carbon Prices to Advance

It is understood that the price of carbon black will be advanced ½-cent per pound on or about January 1, with the f.o.b. quotation set at 2¾ cents a pound and the carload price at New York at 4¼ cents. This will be the first advance in carbon black prices since a series of price cuts brought the price down to 2¼ cents per pound last February. Domestic and export demands for carbon black are said to have improved considerably in recent months.

Winter Joins Schavoir

Russell P. Winter, formerly chief chemist for the Elm City Rubber Company, is now factory superintendent of the Schavoir Rubber Company, Springdale, Connecticut. He joined Schavoir late in August of this year.

Names in the News

RICHARD W. WITHERELL has been named president of the C. F. Church Mfg. Co., Monson, Mass., to succeed the late OTTO KOLSTAD. DUDLEY S. WARTH, formerly vice-president and New York manager, has been named vice-president and general manager of sales.

VAL FOLLO, division superintendent, Gadsden plant, Goodyear Tire & Rubber Co., has been named general superintendent of the new Goodyear factory in Norrköping, Sweden, and E. O. MALMQUIST, development department, Akron plant, has been named chief of technical service. The Swedish plant is expected to be in operation by the first of the year.

FRANK M. FARMER, vice-president and chief engineer of the Electrical Testing Laboratories, New York City, has been re-elected chairman of the Engineering Foundation, the research organization of national engineering societies.

JOSEPH VAN BEMMEL has joined the firm of Little & Christman, members of the Commodity Exchange, Inc., as manager of the crude rubber department.

ANDREW D. MACLACHLAN, development engineer, B. F. Goodrich Co., and associated with the Engineering Department of Akron University, was elected secretary of the American Society of Mechanical Engineers at the annual meeting of the Society held in Columbus, Ohio, last month.

ROYAL E. DAVIS, director of commercial research, Goodyear Tire & Rubber Co., Akron, presided at the opening session of the 1938 Ohio Conference of Statisticians on Business Research, sponsored by the Bureau of Business Research, held at Ohio State University, Columbus, Ohio, on November 12. He was chairman of the session on "Scientific Sampling and Market Research."

W. E. PALMER, secretary and assistant treasurer, Seiberling Rubber Co., Akron, was re-elected grand recorder of the Knights Templar of Ohio at the 96th Annual Conclave of that organization held in Cincinnati last month. The vote was by popular acclamation.

FRED T. KOYLE has joined Carl M. Loeb, Rhoades & Co., 61 Broadway, New York City, brokerage house, as manager of the crude rubber department.

CYRUS S. CHING, director, industrial and publication relations, U. S. Rubber Products, Inc., New York City, addressed the 23rd Annual Meeting of the Associated Industries of Massachusetts at the Hotel Copley Plaza in Boston on October 20.

STANLEY P. FISHER, works manager, American Hard Rubber Co., delivered a paper on "Inventory Control," and GEORGE L. DIRKS, manager, Time Study Department, B. F. Goodrich Co., gave one on "How to Develop a Sensible Personnel Program with the Present Production Staff," at the Annual Production Conference, sponsored by the American Management Association, held at the Hotel Pennsylvania in New York City on November 9-10.

DR. WALTER S. LANDIS, vice-president, American Cyanamid & Chemical Corp., New York City, has been awarded the Perkin Medal for 1938 in recognition of his achievements in the fields of phosphates and cyanamide. He will receive the medal at a joint meeting of the American Chemical Society and the Society of Chemical Industry, to be held in the Chemists' Club, New York City, on January 6.

T. G. GRAHAM, vice-president, B. F. Goodrich Co., discussed "Improved Labor Relations" before the 15th Convention of the National Association of Foremen held in Akron last month.

D. R. BURR, consulting manager for the mechanical goods sales department of the Goodyear Tire & Rubber Co., Akron, a veteran of 44 years' service in the rubber industry, has retired on pension. He joined Goodyear in 1913 and for many years was manager of mechanical goods sales.

To Auction Rubber Machinery

The machinery and equipment of the New York Mackintosh Clothing Company, Mamaroneck, N. Y., will be sold piecemeal at public auction on Tuesday, November 22. The sale, to be held at the plant, will start at 11:00 A.M. Equipment to be offered includes mills, starching machines, spreaders, doublers, an impregnation machine, mixers, churners and measuring machines. All pieces may be inspected on the premises on November 21, the day preceding the sale. Aaron Krock & Co., 390 Main Street, Worcester, Mass., are the auctioneers.

Correction

Alfred A. Curtis was recently elected vice-president and general manager of the Lima Cord Sole and Heel Co., Lima, Ohio, and not president as previously reported. Arthur H. Harrison was elected president. Mr. Curtis joined Lima Cord on August 1, 1938, as general manager, and in his new position assumes the responsibilities formerly exercised by the late F. L. Maire, according to J. E. Grosjean, chairman of the board.

ELECT HINSHAW HEAD OF RUBBER DIVISION

George K. Hinshaw, of the Goodyear Tire & Rubber Co., Akron, has been elected chairman of the Rubber Division, A.C.S., in an election conducted by mail ballots. Other elected officers are: E. B.

George K. Hinshaw

Curtis (R. T. Vanderbilt Co.), vice-chairman; H. I. Cramer (Akron University), secretary; C. W. Christensen (Rubber Service Laboratories Division, Monsanto Chemical Co.), treasurer; and E. H. Krismann (DuPont), sergeant-at-arms. Both Mr. Cramer and Mr. Christensen were re-elected.

The new Executive Committee is composed of: A. R. Kemp (Bell Telephone

E. B. Curtis

Labs.); J. C. Walton (Boston Woven Hose); A. W. Carpenter (Goodrich); G. S. Haslam (N. J. Zinc); and W. G. Nelson (U. S. Rubber). C. C. Davis (Boston Woven Hose) and S. G. Byam (DuPont) will act as *ex officio* members of the Committee.

FINANCIAL NEWS

Boston Woven Hose

Year Ended August 31: Net loss of $202,151 as compared with net income of $434,993 for the preceding year which was equal to $4.53 each on 86,000 common shares after preferred dividend requirements. The operating statement for the year just ended shows a gross income of $36,873, from which was deducted $208,598 for depreciation and other charges. Gross sales declined from $6,737,455 in 1937 to $4,798,453, a loss of 28.8%. The balance sheet as of September 1, 1938, shows total current assets of $3,583,417 as against total current liabilities of $299,343.

Thermoid Company

Third Quarter: Net profit of $10,037, equal to 25 cents each on 39,956 shares of $3 preferred stock, as compared with $16,109, or 40 cents a share, in the preceding quarter, and $111,195, or 17 cents a share on each of 469,823 common shares after preferred dividend requirements, in the corresponding period of the previous year. For the twelve months ended September 30, company reports a net loss of $310,394, contrasted with a net profit of $378,960, equal to 55 cents a common share, for the previous twelve-month period.

General Cable Corp.

Third Quarter: Net loss of $288,097, which compares with net loss of $260,083 in the preceding quarter and net profit of $919,999 in the corresponding period of the previous year. For the first nine months of 1938 the company reports a net loss of $614,327, which compares with a net profit of $2,876,575, or $1.78 a share of common stock, reported for the first nine months of 1937.

Hewitt Rubber Corp.

Third Quarter: Net profit of $32,124, or 19 cents a share, which compares with earnings equal to 36 cents a share in the corresponding period of the previous year. For the first nine months of the current year, company reports net earnings of $53,911, equal to 32 cents a share, which compares with $260,968, or $1.55 each on 168,188 shares, in the corresponding period of 1937.

New Jersey Zinc Co.

Third Quarter: Net profit of $798,246, equal to 40 cents each on $1,963,264 shares of $25-par capital stock, which compares with profit of $734,262, or 37 cents a share, in the preceding quarter, and $2,172,145, or $1.10 a share, in the corresponding period of 1937. For nine months of 1938, company reports a net profit of $2,185,104, equal to $1.11 a share, which compares with $6,523,928, or $3.32 a share, in the corresponding period of the previous year.

Bibb Manufacturing Co.

Year ended August 31: Net income of $957,918, before Federal income taxes, which compares with net income of $1,207,127 after taxes, equal to $6.04 each on 200,000 capital shares, in the preceding fiscal year.

Electric Hose & Rubber

Year Ended August 31: Net loss of $16,755, which compares with net profit of $105,628, equal to $8.29 each on 12,741 capital shares, earned in the previous year.

Mansfield Plans Addition

Mansfield Tire & Rubber Co., Mansfield, Ohio, will shortly launch a $150,000 expansion program which will include the construction of a two-story building, according to George W. Stephens, president. The company currently employs approximately 1,500, and is said to have been operating at capacity for more than a year.

JAPANESE TAKE OVER CHINESE FACTORIES

According to reports from abroad, the Sakai Shoji (Trading) K.K., of Osaka, Japan, has obtained permission from the Japanese military authorities to take over and operate five Chinese-owned rubber factories in Shanghai, *i.e.*, the Chengtai, Tatung Shihyeh, Ichang, Minsheng and Hungta plants. Owners of Chinese factories in areas under Japanese military occupation recently received formal notices that unless arrangements were made to continue operations, "temporary" Japanese operators would take hold.

Prior to the outbreak of the Sino-Japanese conflict, there were 36 Chinese rubber factories operating in Shanghai. It is believed that the five plants to be taken over by the Sakai Shoji are the only ones remaining in the Shanghai area which have not been totally destroyed or damaged beyond repair. The Chengtai plant formerly employed 1,500 and produced approximately 25,000 pairs of rubber shoes a day. The Tatung Shihyeh plant normally employs 250 and is capable of producing 12,000 rickshaw tires a day.

It is further reported that the Sakai Shoji is planning to establish a subsidiary company under the name of the Kiangnan Development Company to operate the five Shanghai factories. The capitalization of the new company would consist largely of the assets taken over from the Chinese.

Obituaries

Robert J. Stokes

Robert J. Stokes, president and general manager of the Joseph Stokes Rubber Company, Trenton, died suddenly on October 19 at his home on the Lawrence-Princeton Road, near Trenton, from a heart attack. He was stricken while in his room and died before a physician could be summoned. He was 55 years of age.

Mr. Stokes, son of the late William J. B. Stokes, prominent rubber manufacturer, was born in Trenton in 1883, attended the old State Model School, and then entered Princeton University, being graduated with the Class of 1904. During vacations at Princeton he worked at miscellaneous jobs for the Thermoid Rubber Company, of which his father was president, and then joined the company after leaving Princeton. In turn, he was made superintendent, treasurer and president of Thermoid, retaining the latter post until his resignation from the company in 1934. In October, 1936, he was elected president of the Joseph Stokes Rubber Company, founded by his grandfather, and was active in the management of that company at the time of his death.

Mr. Stokes was widely known in banking and club circles. He was a director of the Trenton Banking Company, a member of the Trenton Chamber of Commerce, a trustee of the Carolyn Stokes Nursery, an officer of various Masonic bodies, etc. His interests also included golf, fishing, raising chickens and collecting antiques. Funeral services were held at his home on October 22, with interment in Ewing Church Cemetery, Trenton. He leaves a widow and a son.

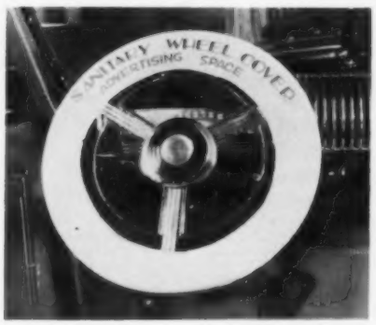
Frederick S. Dickinson

Frederick S. Dickinson, founder and president of the defunct Dickinson Cord Tire Corporation, died at his home in New York City last month at the age of 63. In his early years, Mr. Dickinson was widely known as a champion bicycle rider. He operated a bicycle factory in Indianapolis for a time, and later became sales manager for the Henley Bicycle Works of Richmond, Indiana. Turning his attention to automobile tires, Mr. Dickinson became the first importer of Dunlop Tires. Later, he invented the Dickinson cord tire machine and spent a fortune attempting to develop the perfect tire. His last business venture was the founding and operating of the ill-fated Dickinson Cord Tire Corporation.

New Rubber Goods

Steering Wheel Protector

A protector for the steering wheel of automobiles made of translucent rubber has been developed by Leonard S. Horner, 870 Prospect St., New Haven,



Conn. Designed to fit snugly around the wheel, the protector has crimped edges. It is intended for use when the car goes to the service station or garage for cleaning or repair and keeps the wheel clear of grease, oil and dirt. It may also be applied when the car is in an open parking space and the wheel is subject to dust, cinders and dirt. The new rubber protector can be used 100 times or more, according to Mr. Horner, and may be easily cleaned with soap and water.

Burson Protek-Shus

A knit slip-on of soft jersey and "Lastex" yarn, called Protek-Shus, to be worn over suede shoes in galosh weather, is being marketed by the Burson Knitting Co., Rockford, Illinois.

Protek-Shus resemble the foot of a stocking, with an opening for the heel of the shoe. They have a stretchable heel which slips snugly over the shoe and prevents slipping and sliding. Three sizes are available to fit women's shoes from sizes 3 to 11½. In addition to protecting the nap and finish on suede shoes when galoshes are worn, the new slip-on may also be worn by women when driving cars to prevent foot pedals from scuffing their shoes. They also prevent shoes from soiling garments when packed for travel.

Sno-Pac Overshoe

An all-rubber sports overshoe has been designed by the Converse Rubber Co., Malden, Mass. Known as the Sno-Pac, the new overshoe has a moccasin vamp front, full rubber gusset making it waterproof clear to the top, warm blanket fleece lining, and large nickel eyelets to make lacing easy. The lace front permits simple adjustment on all types of ankles, and extra eyelets in the

top hold the cuff in place when turned down. Sno-Pac is available with white upper or beige upper on British College or Military heel lasts.

Rubber Pum-Pads

Designed to permit women to wear pumps and sandals or any low cut shoe, Pum-Pads are being merchandised by the Pum-Pad Manufacturing Co., Tulsa, Oklahoma. The new item consists of a curved piece of so-called synthetic rubber, perforated to prevent slipping, covered on the upper side with a flesh-tinted knitted material in hosiery stitch. This knitted covering performs a two-

fold function, *i.e.*, it conceals the device and protects the stocking. Pum-Pads will not burn or blister the foot, relieves pressure of vamp against insteps, is easy to apply, and will wear indefinitely.

Monocork Flooring Material

Armstrong Cork Company, Lancaster, Penna., has introduced a plastic, non-slip, water-resistant cork and rubber flooring material called Monocork. It is

composed of latex, a dehydrating powder, granulated cork, and various types of fillers. The principle of setting of this composition is based upon the fact that latex sets by the loss of water while the dehydrating agent sets by the absorption of water; therefore, when these two materials are in one mixture, the setting action of each ingredient is complementary to the other. The rubber content of the composition is high enough to make the product flexible, so that it can withstand considerable distortion before cracking or breaking, while the combination of cork and rubber results in a surface which is resilient underfoot, quiet under traffic, and resistant to wear. Monocork was originally developed by Armstrong's British subsidiary, and is installed on such ships as the "Queen Mary," "Queen Elizabeth," and the new "Nieuw Amsterdam." The accompanying illustration shows a cross section of the new flooring material.

Ferdinand the Bull

The latest member of the "family" of decorated molded rubber Walt Disney characters featured by the Seiberling Latex Products Co., Barberton, Ohio, is Ferdinand the Bull. This newest novelty item is 6 inches long by 4 inches high, and is decorated in four colors. It is

said to be an absolute reproduction of the Disney character which will make its bow in a full-length motion picture shortly.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, NOVEMBER 9, 1938

Crude Rubber

THE price for spot rubber on the Exchange swung in a narrow range this past month, high for the period being 17.19 on November 9 and low 16.70 on October 31. The price broke sharply from 17.15 on October 11 to 17.00 on the following trading day due to foreign selling and dealer short covering. It recovered to 17.16 on October 15 as a result of commission house buying, and then entered a steadily declining position, with slight upward spurts, for the balance of the month. Factory buying, activity in the outside market, reports of lowered stocks at London, and a stronger securities market have all contributed to an advancing price in the past few days, a gain of 34 points being made in today's price of 17.19 as compared with the November 1 price of 16.85. Actual volume on the exchange is light, with trade factors hesitating to make any commitments before the meeting of the International Rubber Regulation Committee on November 15 at which time a quota is expected to be set for the first quarter of 1939. If the quota is retained at 45%, the trade anticipates higher prices.

As of November 9

Plantations—

Ribbed Smoked Sheets—

No. 1 Spot	—	@	.17⅛
January-March	—	@	.17⅜
April-June	—	@	.17⅜
No. 2	—	@	.16⅞
No. 3	—	@	.16⅞
No. 4	—	@	.16⅝
Thin Latex Crepe	—	@	.18⅜
Thick Latex Crepe	—	@	.18⅞
Brown Crepe, No. 1	—	@	.16½
Brown Crepe, No. 2	—	@	.16⅜
Amber Crepe, No. 2	—	@	.16½
Amber Crepe, No. 3	—	@	.16⅜
Amber Crepe, No. 4	—	@	.15⅞
Brown Crepe, Rolled	—	@	.14¼

Latex—

Normal, per lb., carload lots	—	@	.20⅛

Paras—

Up-River, fine	—	@	.15½
Acre Bolivian, fine	—	@	.15¾

Balata—

Surinam sheet	—	@	.38

LONDON MARKET

Standard Smoked Sheets—Buyers—November 9

January-March	8½d	@	8⅝d
April-June	8⅝d	@	8⅝d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—November 9

January-March	—	@	8¼d
April-June	—	@	8⅜d

Reclaimed Rubber

Reclaimers report increased activity in recent weeks based on the larger production schedules in the automobile plants and the general improvement in business conditions. Reclaimed rubber consumed in September reached 11,281 tons, a 7.7% gain over the preceding month, with a larger gain anticipated for October. There has been no change in the price structure since our last report. Current quotations follow:

Shoe

Unwashed, lb.	.06½	@	.06¾
Washed, lb.	.10	@	.10¼

Tube

No. 1 (Floating), lb.	.12	@	.12¼
No. 2 (Compounded), lb.	.08	@	.08¼
Red tube, lb.	.08	@	.08¼

Tires

Black (acid process), lb.	.06¾	@	.07
Black, selected tires, lb.	.06	@	.06¼
Dark Gray, lb.	.09¼	@	.09¾
White, lb.	.11½	@	.12
Truck, Heavy Gravity, lb.	.05½	@	.06
Truck, Light Gravity, lb.	.07	@	.07½

Miscellaneous

Mechanical blends, lb.	.04½	@	.05

Scrap Rubber

(Delivered Akron Mills)

Dealers report a dull market with limited trading in the past few weeks. A fair amount of stock is on hand for present and future calls. Prices have been dropped slightly on several grades of scrap, including auto tire peelings and clean solid truck tires, since our last report. Current quotations follow:

(Prices to Consumers)

Auto tire peelings, ton	15.00	@	16.00
Mixed auto, ton	10.50	@	12.00
Beadless tires, ton	14.50	@	16.00
Clean solid truck tires, ton	18.00	@	20.00
Boots and shoes, ton	18.00	@	20.00
Arctics, untrimmed, ton	12.00	@	13.00
Inner tubes, No. 1, lb.	.06½	@	.07
Inner tubes, No. 2, lb.	.03⅝	@	.03¾
Inner tubes, Red, lb.	.03⅝	@	.03¾

Cotton

With only a few temporary set-backs, cotton prices have been moving upward steadily since our last report. Starting at 8.55 in mid-October, the price jumped to 8.70 on October 20 as the result of a steady volume of trade calling in the nearer months, commission house support, Liverpool buying, and speculative interest. From this point on the price advanced a few points daily abetted by reports of poor weather conditions in the South, firmness of spot markets, scarcity of contracts, and the general influence of the Federal cotton loans. On October 31, the price for middling uplands on the Exchange reached a 9-cent figure. In the past few days, however, cotton prices sagged under heavy liquidation brought on by apprehension of the Government crop estimate. Publication of this estimate on November 8 (Election Day) at 12,137,000 gross bales for 1938, a reduction of 75,000 bales from the previous estimate, served to bring the price back strongly, closing at 9.06 today (November 9). Quotations for middling uplands on the Exchange follow:

	Oct. 10	November 9		
	Close	High	Low	Close
December	8.29	8.54	8.50	8.51
March	8.21	8.48	8.42	8.44
July	...	8.15	8.08	8.10

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3, lb.	.27¼	@	.27¾
Peeler, carded, 23/4/3, lb.	.28¼	@	.28¾
Peeler, carded, 15/3/3, lb.	.25¼	@	.25¾
Peeler, carded, 13/3/3, lb.	.24¼	@	.24¾
Egyptian, carded, 23/5/3, lb.	.40½	@	.40¾
Egyptian, combed, 23/5/3, lb.	.45½	@	.45¾
CHAFERS			
Carded, American, 1 3/16", lb.	.27½	@	.28
Carded, American, 1", lb.	.18	@	.23

Sheetings

48x40	36 in.	5.50	lb.	— @	.03⅜
40x40	36 in.	6.15	lb.	— @	.03¼
40x36	36 in.	6.50	lb.	— @	.03⅜
48x48	40 in.	2.50	lb.	— @	.07
48x48	40 in.	2.85	lb.	— @	.06½
56x60	40 in.	3.60	lb.	— @	.05⅝
48x44	40 is.	3.75	lb.	— @	.05⅝
44x40	40 in.	4.25	lb.	— @	.04½

Ducks

Enameling (single filling), lb.	.21	@	.23
Belting and Hose, lb.	.25	@	—
Single filling, A grade, lb.	.09½	@	.12½
Double filling, lb.	.10½	@	.13½

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM OCTOBER 11 TO NOVEMBER 9

Date	Spot	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Sales
Oct. 11	17.15	17.05	17.11	17.18	17.20	17.20	17.20	17.21	17.19	17.21	17.21	17.23	17.25	——	318
12															
13	17.00	16.93	16.97	17.01	17.01	17.02	17.04	17.05	17.07	17.07	17.08	17.09	17.11	——	327
14	17.06	16.96	17.03	17.10	17.10	17.10	17.09	17.09	17.10	17.10	17.11	17.11	17.11	——	468
15	17.16	17.05	17.12	17.19	17.15	17.17	17.20	17.20	17.20	17.20	17.21	17.25	17.30	——	89
16															
17	16.95	16.88	16.90	16.92	16.95	16.97	16.99	16.95	16.95	16.96	16.87	16.97	16.98	——	371
18	16.98	16.75	16.87	17.00	17.00	17.01	17.03	17.05	17.08	17.08	17.08	17.08	17.08	——	240
19	16.93	16.80	16.87	16.95	16.96	16.98	17.00	17.00	17.01	17.03	17.05	17.06	17.07	——	200
20	16.81	16.61	16.72	16.84	16.85	16.86	16.87	16.87	16.89	16.89	16.90	16.90	16.91	——	163
21	16.92	16.00	16.74	16.89	16.91	16.93	16.95	16.95	16.96	16.99	17.02	17.03	17.04	——	142
22	16.90	16.80	16.85	16.90	16.95	16.96	16.97	16.97	16.97	16.97	16.98	17.00	17.01	——	70
23															
24	16.84	16.70	16.80	16.90	16.90	16.90	16.82	16.85	16.85	16.85	16.86	16.88	16.90	——	107
25	16.85	16.68	16.78	16.85	16.88	16.88	16.88	16.88	16.90	16.90	16.90	16.92	16.95	——	283
26	16.98	16.75	16.85	16.95	17.00	17.00	17.02	17.02	16.99	17.00	17.00	17.01	17.03	——	204
27	16.93	——	16.83	16.93	16.85	16.90	16.96	16.97	16.98	16.98	16.98	16.99	17.01	——	80
28	16.75	——	16.65	16.75	16.75	16.77	16.80	16.81	16.82	16.85	16.88	16.89	16.90	——	272
29	16.75	——	16.67	16.77	16.79	16.81	16.82	16.83	16.85	16.87	16.89	16.89	16.87	——	76
30															
31	16.70	——	16.61	16.70	16.71	16.71	16.71	16.71	16.75	16.75	16.76	16.77	16.79	——	149
Nov. 1	16.85	——	16.81	16.85	16.86	16.86	16.87	16.88	16.89	16.89	16.89	16.89	16.91	16.91	336
2	16.82	——	16.75	16.79	16.79	16.80	16.80	16.81	16.82	16.82	16.82	16.83	16.84	16.86	160
3	16.97	——	16.91	16.95	16.93	16.94	16.96	16.94	16.93	16.92	16.90	16.91	16.92	16.93	190
4	17.03	——	16.98	17.02	17.00	17.00	17.00	16.97	16.95	16.95	16.96	16.96	16.96	16.97	96
5	17.00	——	16.93	16.97	16.96	16.95	16.95	16.95	16.93	16.94	16.95	16.96	16.97	16.98	20
6															
7	17.06	——	17.03	17.05	17.04	17.04	17.04	17.03	17.01	17.01	17.00	17.00	17.00	17.00	211
8															
9	17.19	——	17.18	17.20	17.17	17.16	17.14	17.14	17.15	17.13	17.13	17.14	17.15	17.15	149

New York
November 9, 1938

Rubber CHEMICAL Markets

All Quotations F.O.B. Works Unless Noted

ACCELERATORS

Organic				
A-1 (Thiocarbanilid)	lb.	.26	@	—
A-5-10	lb.	.35	@	.40
A-11	lb.	.52	@	.65
A-19	lb.	.52	@	.65
A-32	lb.	.70	@	.80
A-77	lb.	.42	@	.55
A-100	lb.	.42	@	.55
A-433	lb.	.45	@	.55
Aldehyde ammonia, crystals	lb.	.65	@	.70
Altax	lb.	.55	@	.70
Butyl Zimate	lb.	3.00	@	—
Captax	lb.	.50	@	.60
Crylene	lb.	.55	@	.65
paste	lb.	.45	@	.55
Di-Ortho-Tolyguanidine	lb.	.44	@	.46
Diphenylguanidine	lb.	.35	@	.36
El-Sixty	lb.	.57	@	—
Ethyl Zimate	lb.	3.00	@	—
Ethylidene aniline	lb.	.42	@	.43
Formaldehyde aniline	lb.	.37½	@	.42
Guantal	lb.	.45	@	—
Heptene	lb.	.35	@	.40
Hexamethylenetetramine	lb.	.36	@	—
Lead Oleate, No. 999	lb.	.14	@	—
Witco		.15	@	—
Lithex	lb.	.18	@	.20
Methylenedianiline	lb.	.36	@	.37
Monex	lb.	3.25	@	—
Oxynone	lb.	.64	@	.80
Phenex	lb.	.50	@	.55
Pip-Pip	lb.	2.50	@	—
Pipsolene	lb.	1.55	@	1.85
R & H 40	lb.	.40	@	.41
R & H 50-D	lb.	.42	@	.43
R-2	lb.	1.40	@	1.80
R-23	lb.	.40	@	—
Rotax	lb.	.60	@	.65
Safex	lb.	1.20	@	1.25
SPDX	lb.	.75	@	—
Super-Sulphur No. 1	lb.	.50	@	—
No. 2	lb.	.18	@	.20
Thiocarbanilid, drums	lb.	.24	@	—
Trimene	lb.	.75	@	—
base	lb.	1.20	@	—
Triphenylguanidine	lb.	.60	@	—
Tuads	lb.	2.65	@	—
Ureka	lb.	.60	@	.75
Ureka Blend B	lb.	.60	@	.75
Ureka C	lb.	.56	@	.65
Vulcanex	lb.	.42	@	.43
Vulcone	lb.			
Vulcanol	lb.	.85	@	—
Z-88-P	lb.	.51	@	—
Zimate	lb.	2.65	@	—
Inorganic				
Litharge, domestic	lb.	.07	@	.07½
Magnesia, calcined, heavy	lb.	.04	@	—

COLORS

Blacks (See Compounding Materials)

Blues				
Prussian	lb.	.36	@	.37
Ultramarine	lb.	.15	@	—
Browns				
Mapico	lb.	.13	@	—
Umber, Turkey	lb	.04	@	.04½
Greens				
Chrome	lb.	.21	@	—
Chromium Oxide, bbl.	lb.	.21	@	—
Guignet's Green	lb.	.70	@	—
Reds				
Antimony crimson, 15/17	lb.	.45	@	—
sulfur, free	lb.	.48	@	.60
Indian English	lb.	.09	@	.10
Domestic (Maroon)	lb.	.11	@	—
Red oxide, pure	lb.	.10	@	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼	@	—
Whites				
Cryptone, No. 19	lb.	.05⅝	@	.06⅛
Cryptone CB, No. 21	lb.	.05⅝	@	.06⅛
Cryptone, ZS-20	lb.	.08⅛	@	.08⅝
Cryptone, ZS-86	lb.	.08⅛	@	.08⅝
Lithopone				
Albalith, black label—11	lb.	.04⅛	@	.04⅜
Azolith	lb.	.04⅛	@	.04⅜
Ray-bar	lb.	.05⅞	@	.06⅛
Ray-cal	lb.	.05⅞	@	.06⅛
Rayox	lb.	.16	@	.19
Titanox A	lb.	.15	@	.18
Titanox B	lb.	.05⅝	@	.06⅛
Titanox C	lb.	.05⅝	@	.06⅛
Zinc Oxide—American Process				
American Azo:				
ZZZ (lead free)	lb.	.06¼	@	.06½
Anaconda, lead free	lb.	.06¼	@	.06½
Horsehead Lead Free Brand:				
Special—3	lb.	.06¼	@	.06½
XX Red—4	lb.	.06¼	@	.06½
XX Red—72	lb.	.06¼	@	.06½
XX Red—78	lb.	.06¼	@	.06½
XX Red—103	lb.	.06¼	@	.06½
Kadox, black label—15	lb.	.06½	@	.06¾
Blue label—16	lb.	.06½	@	.06¾
Red label—17	lb.	.06½	@	.06¾
St. Joe, black label	lb.	.06¼	@	.06½
green label	lb.	.06¼	@	.06½
red label	lb.	.06¼	@	.06½
U. S. P—7, bbls.	lb.	.09½	@	.09¾
Zinc Oxide—French Process				
Florence White seal—7 bbls.	lb.	.08½	@	.08¾
Green seal—8	lb.	.08	@	.08¼
Red seal—9	lb.	.07½	@	.07¾
Yellows				
Cadmolith	lb.	.50	@	.55
Chrome	lb.	.14½	@	.15½
Mapico	lb.	.09½	@	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.027	@	.062
Bone, powdered	lb.	.05½	@	.12½
Carbon, compressed	lb.	.0435	@	.0775
uncompressed	lb.	.0435	@	.0775
"Certified"	lb.	—	@	—
Spherons	lb.	—	@	—
"Disperso"	lb.	.027	@	.036
Drop, bbls.	lb.	.05½	@	.14
"Excello," compressed	lb.	.027	@	.0775
"Fumonex"	lb.	.03	@	.07
"Gastex"	lb.	.03	@	.07
Lampblack	lb.	.07	@	.12
"Micronex"	lb.	.027	@	.036
"Supreme"	lb.	.027	@	.0775
Thermatomic—"P 33"	lb.	.04¾	@	.07¾
"Thermax"	lb.	.01¾	@	.05
United "Dixie" & "Kosmos"	lb.	.027	@	.036

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85	@	24.50
Ammonia carbonate, lump	lb.	.10¼	@	.12
Asbestine	ton	13.00	@	15.00
Barium carbonate (98-100%)	ton	—	@	—
Barium Dust	lb.	.05	@	.06
Barytes	ton	23.65	@	31.15
Basofor	lb.	.04½	@	—
Bentonite	lb.	.02	@	.03
Blanc fixe dry f.o.b. works	ton	60.00	@	65.00
Calcene	ton	37.50	@	45.00
Catalpo (fact.)	lb.	.02	@	—
Chalk, precipitated				
Suprex white, extra lt.	ton	45.40	@	60.00
heavy	ton	45.00	@	55.00
Clay, Kaolin, domestic	ton	7.50	@	15.00
Aerfloted, Suprex	ton	9.50	@	21.00
Congaree	ton	9.50	@	—
Crown (f.o.b. plant)	ton	9.50	@	—
Dixie	ton	11.00	@	30.00
Dixie, Jr.	ton	9.50	@	29.00
McNamee	ton	9.50	@	22.00
Par	ton	9.50	@	22.00
Witco	ton	9.50	@	—
Cotton Flock	lb.	.11	@	.15
Glues, extra white	lb.	.28	@	.30
medium white	lb.	.14	@	.19
Kalite No. 1	ton	24.00	@	50.00
Kalite No. 3	ton	34.00	@	60.00
"Lime Crest" Industrial Filler No. 100	lb.	—	@	—
Magnesium carbonate	lb.	.07½	@	—
Mica	ton	35.00	@	44.00
Pyrax A	ton	7.50	@	20.00
Rottenstone (powdered)	lb.	.02½	@	.05
Soapstone, powdered	ton	16.00	@	22.00
Starch, powdered	cwt.	2.90	@	4.10
Talc, domestic	ton	17.00	@	20.00
Whiting, commercial	ton	17.00	@	18.00
Columbia Filler	ton	9.00	@	14.00
English Cliffstone	ton	33.00	@	43.00
Witco	ton	6.00	@	—
Wood Flour	ton	20.00	@	25.00
Zinc Carbonate	lb.	—	@	.10¾
Zinc Stearate	lb.	.23	@	—

MINERAL RUBBER

285°-300° Mineral Rubber	ton	22.00	@	42.00
Black Diamond	ton	27.00	@	—
Genasco, solid (factory)	ton	25.00	@	27.00
Hard Hydrocarbon	ton	22.00	@	42.00
Parmr, solid	ton	25.00	@	—
Pioneer, MR, solid	ton			
Pioneer-granulated	ton			

MISCELLANEOUS

Aromatics—Rodo #0	lb.	3.50	@	4.00
Rodo #10	lb.	4.50	@	5.00
Curodex 19	lb.	2.75	@	—
Curodex 188	lb.	3.50	@	—
Curodex 198	lb.	4.50	@	—
Para-Dors No. 5145	lb.	2.00	@	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.40	@	—
Darvan (dispersing agent)	lb.	.30	@	.50
Santomerse (dispensing, wetting, penetrating and stabilizing agent)	lb.	.13	@	—
Sunproof	lb.	.35	@	.37½
Sponge Paste	lb.	—	@	.80
Tackol (tackifier)	lb.	.115	@	—
Tonox	lb.	.56	@	.60

SOFTENERS

Acids				
Acetic, 28%, bbls.	100 lb.	2.53	@	2.78
Nitric, 36 degrees	cwt.	5.00	@	6.00
Sulfuric, 66 degrees	ton	15.50	@	16.50
Acids, Fatty				
Laurex	lb.	.12	@	.14
Stearex Beads	lb.	.08	@	.09
Stearic, double pressed	lb.	.12½	@	.13½
Stearite	lb.	.10½	@	.11¼
Alkalies				
Caustic Soda, 76%	cwt.	3.15	@	3.80
Soda Ash, 58%, C.L.	cwt.	—	@	2.35
Oils				
Cycline Oil	gal.	.20	@	—
Degras, bbls.	lb.	.07¾	@	.08
Fluxrite	lb.	.05½	@	.06½
Palm Niger	lb.	.05½	@	.06½
Para-Flux	gal.	.17	@	—
Petrolatum, light	lb.	.03½	@	.03¾
Pigmentaroil, tank cars	gal.	.16	@	—
in drums	gal.	.22½	@	.23½
Pine, steam distilled	gal.	.64	@	.69
dest. dist., drums	gal.	.49	@	.50
Rosin Oil, cmpd	gal.	.40	@	—
Rubberol, f.o.b. Chicago	lb.	.13½	@	.14
Rubtack	lb.	.08	@	.10
Seedine, c.l.	lb.	.07¼	@	—
Tackol	lb.	.08½	@	.18
Witco Palm Oil	lb.	.07	@	—
Witco Softener No. 20	gal.	.20	@	—
Woburn No. 8, c.l.	lb.	.06	@	—
Wobonite, c.l.	lb.	.05	@	—
Resins and Pitches				
Pitch, Burgundy	lb.	.05½	@	.06½
coal tar	ton	19.00	@	22.00
hardwood	ton	16.00	@	22.50
pine, 200 lb. gr. wt.	bbl.	6.00	@	6.50
Pigmentar, tank cars	gal.	.16	@	—
in drums	gal.	.22½	@	.23½
R. S. L. Resin	lb.	—	@	—
Retort Pine Tar, drums.	ton	20.00	@	26.00
Solvents				
Acetone, pure	lb.	—	@	.06¼
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.33	@	.39
Benzene, 90%	gal.	.18	@	.23
Beta-Trichlorethane	gal.	—	@	.20
Bondogen	lb.	.98	@	1.65
Carbon, bisulfide	lb.	.05¼	@	.08
Carbon tetrachloride	lb.	.05½	@	.08
Dichlorethylene	lb.	—	@	.25
Dipentene, cml., drums	gal	.41	@	.50
Dryolene (f.o.b. Okla.)	gal.	.10	@	.10½
Ethylene dichloride	lb.	.05½	@	.06¼
Plastogen	lb.	.07¾	@	.12½
Reogen (drums)	lb.	.11½	@	.20
Rub-Sol (f.o.b. Okla.)	gal.	.09	@	—
Trichlorethylene	lb.	—	@	.09½
Turpentine, spirits	gal.	.43	@	.47
dest. dist., drums	gal.	.33	@	.41
Waxes				
Beeswax, white	lb.	.39	@	.45
Carnauba, yellow	lb.	.46	@	.47½
Ceresin, white, dom.	lb.	.08	@	.11
Montan, crude	lb.	.10¾	@	.11¾
Paraffin (c.l.—f.o.b. N. Y.)				
Yellow crude scale	lb.	.02¾	@	—
White crude scale 124/126	lb.	.02¾	@	.03
Refined, 122/127	lb.	.04½	@	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.50	@	2.10
Exel	lb.	1.00	@	1.40
Gel	lb.	.57	@	.77
Hipar	lb.	.65	@	.92
Powder	lb.	.52	@	.73
Resin	lb.	.52	@	.73
Resin D	lb.	.52	@	.73
White	lb.	1.25	@	1.75
Albasan	lb.	.70	@	.75
Antox	lb.	.56	@	—
B-L-E	lb.	.57	@	.60
Flectol H	lb.	.54	@	—
Flectol White	lb.	1.00	@	—
Flectol B	lb.	.54	@	—
Neozone	lb.	.63	@	—
Oxynone	lb.	.68	@	—
Perflectol	lb.	.67	@	.75
Retardex	lb.	.35	@	.40
Santoflex A	lb.	—	@	—
Santoflex B	lb.	.54	@	—
Stabilite	lb.	.57	@	.62
Stabilite Alba	lb.	.70	@	.75
VGB	lb.	.55	@	.60

MOLD LUBRICANTS

Aresklene	lb.	—	@	—
Cocoa Soapstock	lb.	.06	@	.08
Dipex	lb.	.06	@	.08
Lubrex	lb.	.25	@	.30
Mold Paste	lb.	.18	@	—
Rubberol, f.o.b. Chicago	lb.	.13½	@	.14
Rusco, f.o.b. Nitro	lb.	.12	@	.30
Sericite, f.o.b. N. Y.	ton	65.00	@	—
Soap Tree Bark, cut, sifted	lb.	.06	@	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.19	@	—
Black	lb.	.07	@	.11
White	lb.	.08	@	.12
Brown	lb.	.07	@	.11
Neophax	lb.	.10¼	@	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.07½	@	.15
Sulfur Chloride, yellow (drs.)	lb.	.04	@	—
Sulfur flour,				
Refined, 100% pure (bags)	cwt.	2.50	@	3.65
Commercial (bags)	cwt.	1.60	@	2.35
Telloy	lb.	2.00	@	—
Vandex	lb.	2.00	@	—

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,362	185,060,304	26.71	8,772	5,672,319	28.87	300,590
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1937:							
Aug.	48,020	20,595,314	19.15	670	265,298	17.69	47,350
Sept.	55,123	22 119,248	17.91	668	280,741	18.76	54,455
Oct.	51,171	20,250,893	17.67	450	172,466	17.13	50,721
Nov.	51,958	19,905,523	17.01	159	66,501	18.72	51,799
Dec.	68,006	24,934,206	16.37	290	91,764	14.14	67,716
1938:							
Jan.	43,984	15,115,732	15.34	325	118,514	16.27	43,659
Feb.	39,380	13,095,429	14.85	305	109,756	16.08	39,075
Mar.	41,592	13,494,654	14.48	646	198,865	13.74	40,946
Apr.	31,042	9,495,476	13.66	250	75,797	13.55	30,792
May	27,229	8,010,250	13.13	528	167,831	14.20	26,701
June	25,983	7,150,115	12.29	399	116,458	13.03	25,584
July	21,771	5,723,381	11.74	420	127,522	13.54	21,351
Aug.	30,798	8,477,231	12.29	432	133,350	13.79	30,366
Sept.	34,383	10,650,107	13.83	803	242,324	13.48	33,580

* Revised.

Note: "Gross Imports" do not include latex or guayule. To secure more accurate figures for "Net Imports" latex and guayule figures (shown below) should be added and the re-export figure deducted from the total. Annual figures for 1922, however, include both latex and guayule; guayule only is included in 1923. Annual figures for 1922-36 were revised in February, 1937.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule: Tons	Guayule: Dollars	Balata: Tons	Balata: Dollars	Jelutong: Tons	Jelutong: Dollars	Liquid Latex (1): Tons	Liquid Latex (1): Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2 121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1937:								
Aug.	335	95,893	16	5,876	363	107,611	1,801	838,778
Sept.	329	90,822	5	2,196	701	214,511	1,901	839,159
Oct.	247	68,178	29	12,090	460	149,516	1,958	844,205
Nov.	251	69,452	29	9,374	593	194,889	2,085	875,074
Dec.	140	34,347	31	11,491	1,325	470,553	1,804	694,164
1938:								
Jan.	538	147,685	23	8,958	598	224,443	1,400	494,242
Feb.	218	60,097	33	11,393	892	355,080	1,684	560,883
Mar.	150	41,518	69	19,454	587	239,271	979	327,844
Apr.	188	50,423	66	25,741	1,265	444,756	889	295,690
May	229	61,756	29	8,806	900	274,652	879	279,502
June	150	41,518	34	11,406	918	276,126	695	214,420
July	223	49,099	51	16,130	869	267,491	634	209,526
Aug.	250	53,285	41	13,637	526	159,784	876	308,573
Sept.	173	37,954	39	13,896	740	225,161	683	235,242

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

	Figures on Monthly Basis: 1931*	1932*	1933*	1934*	1935*	1936*	1937*	1938
Jan.	28,640	29,648	22,645	39,190	46,636	48,631	50,879	29,429
Feb.	28,880	31,821	21,392	40,515	42,720	36,841	51,950	23,868
Mar.	32,883	29,505	17,843	47,003	42,153	42,813	54,129	30,487
Apr.	33,418	27,518	25,928	44,853	44,247	52,031	51,859	27,984
May	37,927	30,957	44,074	42,918	41,101	50,612	51,795	28,947
June	38,027	41,475	50,743	40,147	36,156	52,772	51,860	30,629
July	32,030	29,976	49,614	32,553	35,917	48,250	43,703	32,209
Aug.	27,666	23,721	44,428	33,216	38,775	46,777	41,506	38,170
Sept.	23,707	23,847	35,281	30,258	37,086	46,449	43,945	37,823
Oct.	22,342	22,286	31,543	31,253	41,969	49,637	38,754	
Nov.	23,010	23,231	28,831	34,748	42,310	50,433	34,025	
Dec.	21,470	18,015	28,757	36,569	42,474	49,754	29,195	
Tot.	350,000	332,000	401,079	453,223	491,544	575,000	543,600	

* Revised.

Note: Figures for 1931-1937 were revised in May, 1938, and are now based on Department of Commerce survey figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	Consumption: % to Crude Stocks*	Stocks*	Year	Production	Consumption: Tons	Consumption: % to Crude Stocks*	Stocks*
1928	208,516	223,000	50.4	24,785	1933	99,560	81,602	19.9	20,746
1929	218,954	226,588	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,000	1935	122,948	113,078*	23.0*	25,069
1931	133,351	124,126	33.9	19,257	1936	150,571	141,486*	24.6*	19,000*
1932	75,608	77,504	23.4	16,354	1937	178,776	157,990	29.1	26,260

	Figures on Monthly Basis: Production	Consumption: Tons	Consumption: % to Crude	Stocks*		Production	Consumption: Tons	Consumption: % to Crude	Stocks*
1937:									
Jan.*	15,129	14,450	28.4	18,822	July	16,241*	12,128*	27.8*	17,682*
Feb.*	15,192	14,578	28.1	18,490	Aug.	16,543*	13,227*	31.9*	19,706*
Mar.*	14,462	15,601	28.9	16,450	Sept.	16,410	13,681	37.4	21,597
Apr.	13,884	15,607	30.1	14,046	Oct.	15,849	12,234	31.6	23,572
May	15,793	14,693	28.4	14,647	Nov.	12,406	9,703	28.6	24,620
June	16,052	14,414	27.8	14,535	Dec.	10,815	7,674	26.3	26,260
1938:									
Jan.	8,467	6,673	22.7	27,179	July	7,109	8,273	25.7	18,832
Feb.	6,012	6,867	28.8	26,431	Aug.	10,472	10,732	28.1	17,892
Mar.	6,669	8,573	27.1	24,401	Sept.	12,016	11,281	29.8	18,127
Apr.	6,399	7,480	26.7	23,339	Oct.	.....	.....	...	.....
May	6,866	8,009	27.7	22,275	Nov.	....	.....	...	.....
June	7,584	8,274	27.0	21,040	Dec.	.....	.....	...	.....

* Stocks on hand at the end of month or year.

* Revised.

Note: Figures for 1936 were revised on June 1, 1937, and are now based on Department of Commerce survey figures.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1936*	1937	1938		1936*	1937	1938
January	32,344	33,696	35,176	August	46,061	49,597	50,459
February	27,178	32,000	31,861	September	44,366	47,245	
March	35,864	40,561	41,259	October	44,163	45,361	
April	38,864	43,409	43,254	November	39,954	42,666	
May	42,010	45,484	44,911	December	39,590	39,457	
June	44,522	48,580	48,293				
July	46,865	50,704*	47,474	Total	481,606	518,760	

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1926	24,199,524	1930	17,364,096	1934	12,255,118
1927	19,700,003	1931	11,233,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,192
1929	24,141,502	1933	8,713,962	1937	22,257,964

1938		1938		1938	
January ...	527,899	May	706,188	September .	819,089
February ..	477,600	June	527,121	October ...	.....
March	854,031	July	406,419	November ..	.....
April	970,545	August	467,506	December ..	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1936																																
July	16⅞		16⅞			16⅞	16½	16⅞	16⅝	16⅛			16⅝		16½	16⅞	16⅞				20⅛			16⅜				16½		16⅞	16⅞	16.55
Aug.																																
Sept.		16⅞	16⅞	16⅝	16⅛	16⅛	16⅜	16⅜	16⅜	16⅜	16⅜	16¼	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16⅞	16⅞	20⅛	16⅜	16⅜	16⅜	16⅜	16¼	16¼	16⅜	16⅜	16⅜	16⅜	16.38
Oct.		16⅞	16½	16⅝	16½	16⅝	16⅜	16⅜	16½	16⅜	16⅜	16⅜	16⅜	16⅜	16½	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16.38
Nov.		17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17.13
Dec.		18½	18⅜	19			19⅜	19⅜	19⅜	19⅜	19	19		19¼	19⅜	19⅜	20¼	20¼	20⅜	20⅜		20⅜	20⅜	20⅜	20⅜			23	22⅜	21¾	21⅜		20
1937																																
Jan.				20⅜	20¾	21⅜	21⅛	21⅛	22⅛	22⅜	23⅜	22⅜	22	21⅛	21⅛	21⅜	21⅜	21⅜	20⅛	21⅜	20⅛	20⅛	20⅛	20⅛	20⅛	20⅝	21⅜	21⅜	21⅜	21⅜	21⅜		21.38
Feb.		21		21⅛	21⅛	21½		21⅛	21½	23⅛	23⅛	23⅛	23⅜	22⅛	24⅛	24⅜	24⅜	24⅜	25⅛	24⅜	24⅜	24⅜	24⅜	24⅜	25⅛	25⅛	26⅛	26⅛	26⅛	26⅛		24.10
Mar.		21⅜	21⅜	21⅛	22½	23⅛	24⅛	24⅜	22⅜	24⅜	24⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜		23.38
April		26⅜	26⅜	25⅜	25⅜	24⅜	24⅜	24⅜	24⅜	24⅜	24⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜		23.38
May			21	21⅜	21⅜	21⅜	21⅜	22⅜	22⅜	24⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜		23.38
June		20⅞	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜		19.38
July		19⅜	18⅞	18½	18⅛	18⅛	19⅛	19⅛	18⅛	18⅛	18⅛	19	18⅛	18⅛	19⅛	19⅛	19⅛	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞		18.88
Aug.		18⅛	18¾	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛		18.13
Sept.		18⅛	18¾	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛		18.13
Oct.		17¾	17¾	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝		17.63
Nov.		15⅛	14⅞	15½	14⅛	14⅞	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛		15.13
Dec.		15																														
1938																																
Jan.		14⅞	14⅞	14⅞	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜		14.38
Feb.		14⅞	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛		14.13
Mar.		14⅞	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛		14.13
April		10⅞																														
May																																
June		11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12		12.00
July		15⅞					11½	11½	12⅛	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜		14.38
August																																
Sept.		15⅛	15⅛	15⅛	14⅜	16	15⅞	15⅞	15⅞	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛		15.13
Oct.		16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛		16.13
Nov.		16⅛	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝		16.38

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1911-1930

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1911	141.30	1915	65.85	1919	48.70	1923	29.45	1927	**37.72**
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	**22.48**
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	**20.55**
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	**11.98**

Average Monthly Price per Pound Since 1930

	1931 Cents	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents
Jan.	8.34	4.38	3.08	9.32	13.10	14.35	21.37	**14.63**
Feb.	7.70	4.03	2.95	10.45	12.92	15.48	21.33	**14.71**
Mar.	7.71	3.35	3.01	11.01	11.51	15.89	24.09	**13.55**
Apr.	6.43	3.02	3.56	12.10	11.55	15.98	23.44	**11.84**
May	6.49	3.09	4.95	13.26	12.05	15.62	21.14	**11.57**
June	6.35	2.66	6.15	13.51	12.57	15.85	19.29	**12.57**
July	6.37	2.89	8.01	14.60	12.10	16.49	18.86	**15.37**
Aug.	5.38	3.63	7.31	15.47	11.98	16.25	18.37	**16.08**
Sept.	5.08	3.84	7.30	15.36	11.55	16.46	18.55	**16.15**
Oct.	4.87	3.65	7.64	13.96	12.62	16.55	16.28	16.89
Nov.	4.65	3.44	8.66	13.04	13.15	17.97	14.60	
Dec.	4.64	3.24	8.87	12.98	13.28	20.01	15.41	
Average for Year	6.17	3.49	5.96	12.92	12.37	16.41	19.39	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1938 Aug.	1938 Sept.	1938 Oct.	1938 Nov.	Day	1938 Aug.	1938 Sept.	1938 Oct.	1938 Nov.
1		7⅞		8¼	17	7⅛		8½	
2	7⅛	7⅞		8¼	18	7⅛		8⅜	
3	7⅛		8⅛	8⅛	19	7⅞	7⅛	8⅜	
4	7⅛		8⅛	8⅜	20		8⅛	8⅜	
5	7⅛	7⅞	8¼	8⅛	21		8⅛	8⅜	
6		7⅛	8⅜		22	7⅛	7⅛	8⅜	
7		7⅛	8⅛	8⅜	23	8	7⅞		
8	7⅛	7⅞	8⅜	8⅜	24	8⅛		8⅜	
9	7⅛	7⅛		8⅜	25	8		8⅜	
10	7⅛		8⅛		26	8⅛	7⅝	8¼	
11	7⅞		8⅛		27		7⅝	8⅜	
12	7¾	8⅛	8⅜		28		7⅞	8⅛	
13		8	8⅞		29	7⅞	7¾	8⅛	
14		7⅛	8½		30	7⅞	8⅛		
15	7¾	8⅛	8½		31	7⅛		8⅛	
16	7⅛	7⅛							

Average Monthly Price Per Pound

Month	1935 Pence	1936 Pence	1937 Pence	1938 Pence	Month	1935 Pence	1936 Pence	1937 Pence	1938 Pence
Jan.	6.434	6.758	10.378	**7.077**	Aug.	5.696	7.581	8.830	**7.841**
Feb.	6.292	7.255	10.503	7.029	Sept.	5.508	7.577	8.935	7.918
Mar.	5.745	7.450	11.766	6.590	Oct.	6.130	7.898	7.855	8.355
Apr.	5.604	7.502	11.471	**5.793**	Nov.	6.308	**8.572**	7.080	
May	5.822	7.335	10.250	**5.632**	Dec.	6.340	9.580	7.332	
June	6.027	7.352	9.548	6.147	Average for Year	5.976	7.713	9.424	
July	5.801	7.696	9.136	7.464					

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1938 Sept.	1938 Oct.	1938 Nov.	Date	1938 Sept.	1938 Oct.	1938 Nov.	Date	1938 Sept.	1938 Oct.	1938 Nov.
1	8.35	8.25	9.01	11		8.55		22	8.25	8.75	
2	8.33		9.01	12	8.06			23	8.25		
3	8.22	8.30	8.94	13	7.88	8.55		24	8.25	8.75	
4		8.35	8.87	14	7.95	8.55		25		8.75	
5		8.40	8.88	15	7.99	8.55		26	8.25	8.80	
6	8.10	8.45		16	7.95			27	8.25	8.80	
7	8.18	8.50	8.94	17	8.25	8.55		28	8.25	8.88	
8	8.19	8.50		18		8.55		29	8.25	8.93	
9	8.08		9.06	19	8.25	8.55		30	8.25		
10	8.01	8.50		20	8.25	8.70		31		9.01	
				21	8.25	8.75					

Average Monthly Price Per Pound

	1935 Cents	1936 Cents	1937 Cents	1938 Cents		1935 Cents	1936 Cents	1937 Cents	1938 Cents
Jan.	12.70	11.91	13.06	**8.57**	Aug.	11.48	12.28	10.41	**8.41**
Feb.	12.58	11.53	13.15	**8.91**	Sept.	10.80	12.31	9.02	**8.17**
Mar.	11.63	11.43	14.46	**8.92**	Oct.	11.28	12.30	8.42	**8.61**
Apr.	11.73	11.71	**14.23**	**8.76**	Nov.	12.01	12.23	**7.96**	
May	12.25	11.68	13.34	**8.50**	Dec.	11.99	12.83	**8.26**	
June	11.89	12.02	12.70	**8.38**	Average for Year	11.88	12.11	**11.44**	
July	12.26	13.11	12.26	**8.85**					

Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of	ON HAND 1936	ON HAND 1937	ON HAND 1938	AFLOAT 1936	AFLOAT 1937	AFLOAT 1938	ON HAND AND AFLOAT 1936	ON HAND AND AFLOAT 1937	ON HAND AND AFLOAT 1938
Jan.	296,683	204,436	274,581	43,870	55,096	57,356	340,553	259,532	331,937
Feb.	293,631	195,692	294,338	46,532	53,538	47,459	340,163	249,230	341,797
Mar.	284,561	192,980	299,172	58,935	56,994	41,882	343,496	249,974	341,054
Apr.	277,478	176,289	301,436	47,678	72,530	39,071	315,156	248,819	340,507
May	262,415	175,273	299,720	48,860	58,542	32,859	311,275	233,815	332,579
June	245,544	172,056	294,566	47,228	57,215	32,079	292,872	229,271	326,645
July	235,850	167,094	284,914	60,343	75,779	40,400	296,193	242,873	325,314
Aug.	230,167	174,195	277,463	63,597	80,439	47,772	293,764	254,634	325,235
Sept.	233,336	186,193	276,586	62,240	83,288	48,927	295,576	269,481	325,513
Oct.	224,000	200,025		67,825	80,653		291,825	280,678	
Nov.	211,480	222,707		73,691	81,302		285,171	304,009	
Dec.	223,000	262,204		56,567	63,099		279,567	325,303	

* Revised.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1936	London 1937	London 1938	Liverpool 1936	Liverpool 1937	Liverpool 1938
January	84,791	29,005	40,203	77,188	41,895	21,711
February	79,757	26,508	46,596	77,138	37,078	24,737
March	74,779	21,292	50,233	72,823	30,622	26,220
April	68,932	21,128	54,296	71,388	27,443	28,277
May	61,349	21,351	57,194	69,150	25,081	29,862
June	55,993	21,964	60,307	66,173	21,258	31,837
July	49,575	22,589	62,236	63,715	19,424	32,825
August	45,749	25,211	65,113	62,367	19,817	34,315
September	44,364	28,462	63,321	59,485	21,190	34,645
October	40,777	30,465		55,738	21,327	
November	37,495	33,304		51,184	21,399	
December	33,027	35,633		45,291	21,978	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [2]	Holland	Para and Manaos
At end of 1937					
October	41,948*	43,900	4,743	117	1,780
November	38,778	45,854	5,378	105	2,901
December	44,792*	45,734	5,632	100	1,771*
At end of 1938					
January	48,494*	49,643	5,976	131	2,024
February	46,241	47,990	5,653	169	2,342
March	50,797	48,473	5,490	180	1,212
April	40,614	45,008	4,812	155	1,083
May	40,598	45,426	4,876	169	816
June	44,729	49,290	4,488	190	904*
July	45,529	52,081	5,014	711	944
August	41,002	49,922	4,659	672	1,032

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
End of: 1937				
July	75,779	45,100	23,121	144,000
August	80,439	40,300	19,261	140,000
September	83,288	37,400	20,312	141,000
October	80,653	35,000	19,347	135,000
November	81,302	39,100	6,598	127,000
December	63,099	45,100	26,801	135,000
End of: 1938				
January	57,356	40,500	15,144	113,000
February	47,459	44,200	16,341	108,000
March	41,882	44,700	22,418	109,000
April	39,071	42,960	31,969	114,000
May	32,859	40,600	20,541	94,000
June	32,079	42,580	17,341	92,000
July	40,400	39,150	25,450	105,000
August	47,772	32,000	21,228	101,000
September	48,927	30,000	15,073	94,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate

TOTAL PRINCIPAL WORLD STOCKS

(Figures from the Survey of Current Business)

At end of	1933	1934	1935	1936*	1937	1938
January	634,797	661,948	698,153	600,479	454,249*	551,632*
February	626,227	663,308	686,195	599,355	445,265*	569,242*
March	638,428	666,382	678,809	583,318	447,856*	591,968
April	629,159	658,796	677,006	567,172	428,249*	593,340
May	626,537	689,230	677,569	541,871	413,134*	577,063*
June	613,055	672,804	671,525	520,255	434,250*	583,952
July	618,258	676,200	679,061	519,074	445,782	593,481
August	617,449	674,702	680,644	500,520	457,462*	580,489*
September	623,683	694,361	661,509	493,585	470,768*	566,902
October	636,597	680,616	655,000	486,159	479,398*	
November	642,968	684,408	617,300*	466,491	493,266*	
December	654,890	705,975	613,987*	466,576	545,533*	
Monthly Avge.	630,171	677,395	666,397*	528,738	460,022*	

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Quarter	Production Figures on Quarterly Basis 1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	12,323	11,004	6,635	13,437	13,355	11,798	16,142	7,714
Apr.-June	16,295	12,980	14,412	13,565	12,597	15,443	16,421	8,570
July-Sept.	12,004	9,245	14,707	9,822	11,312	15,467	12,659	11,416
Oct.-Dec.	8,117	6,856	9,550	10,406	12,099	15,409	10,063	
Total	48,739	40,085	45,304	47,230	49,363	58,117	55,285	

Quarter	Shipment Figures on Quarterly Basis 1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	11,268	8,760	6,981	10,730	11,154	10,944	14,667	7,716
Apr.-June	15,919	18,021	15,139	14,998	13,473	16,530	16,324	10,745
July-Sept.	14,354	8,141	13,707	11,648	13,489	14,558	13,591	11,936
Oct.-Dec.	8,510	5,329	8,265	9,310	12,066	13,331	10,864	
Total	50,051	40,251	44,092	46,686	50,182	55,363	55,446	

Quarter	Inventory Figures [2] 1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar	10,014	9,878	7,290	11,651	11,675	9,087	12,488	10,808
Apr.-June	10,447	4,999	6,615	10,219	10,755	7,835	12,529	8,763
July-Sept.	8,158	6,096	7,595	8,419	8,288	9,012	11,615	8,406
Oct.-Dec.	7,775	7,644	8,888	9,455	8,196	11,114	10,767	

Figures for Recent Months

	PRODUCTION 1936	1937	1938	SHIPMENTS 1936	1937	1938	INVENTORY [2] 1936	1937	1938
July	5,446	4,292	3,353	5,744	5,190	3,947	7,750	11,654	8,201
Aug.	5,017	3,983	4,093	4,977	4,889	4,046	7,799	10,813	8,330
Sept.	4,984	4,384	3,970	3,837	3,512	3,943	9,012	11,615	8,406

AUTOMOBILE INNER TUBES

Quarter	Production Figures on Quarterly Basis 1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	11,989	10,721	6,230	12,823	12,553	11,935	15,714	6,938
Apr.-June	15,388	11,913	13,001	13,191	11,631	14,678	15,299	7,177
July-Sept.	12,839	8,286	14,356	10,321	11,270	15,377	11,949	10,462
Oct.-Dec.	8,117	5,970	9,000	9,891	12,425	15,257	9,024	
Total	48,333	36,890	42,587	46,226	47,879	57,247	51,986	

Quarter	Shipment Figures on Quarterly Basis 1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	11,251	8,918	6,539	10,640	11,252	11,410	14,498	6,969
Apr.-June	15,314	16,271	13,292	14,553	11,928	15,169	15,381	9,301
July-Sept.	15,282	7,761	13,370	11,545	13,251	15,125	12,805	10,541
Oct.-Dec.	8,174	4,961	8,189	8,306	11,636	12,921	9,693	
Total	50,021	37,911	41,390	45,044	48,067	54,625	52,377	

Quarter	Inventory Figures [2] 1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	10,475	9,448	6,369	10,244	10,406	8,692	11,904	10,093
Apr.-June	10,504	5,174	6,097	8,795	10,050	8,105	11,746	8,108
July-Sept.	8,095	5,753	7,008	7,639	7,565	8,627	11,242	7,907
Oct.-Dec.	7,922	6,749	7,815	9,180	8,231	10,985	10,235	

Figures for Recent Months

	PRODUCTION 1936	1937	1938	SHIPMENTS 1936	1937	1938	INVENTORY [2] 1936	1937	1938
July	5,177	4,019	2,784	5,758	5,046	3,356	7,725	10,869	7,512
Aug.	5,039	3,885	3,815	5,136	4,687	3,570	7,621	10,144	7,808
Sept.	5,161	4,044	3,863	4,231	3,073	3,615	8,627	11,242	7,907

[1] Based on reports received from the Rubber Manufacturers Association.
[2] Held by manufacturers at end of period indicated.

Automobile Production

	United States Total	Passenger Cars	Trucks	Canada Total	Passenger Cars	Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,128
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936*	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937*	4,808,974	3,915,889	893,085	207,000	152,631	54,369	5,015,974
1938							
Jan.*	209,506	155,505	54,001	17,624	13,385	4,239	227,130
Feb.*	186,523	139,380	47,143	16,066	11,753	4,313	202,589
Mar.*	221,796	174,065	47,731	16,802	12,276	4,526	238,598
Apr.	219,314	176,078	43,236	18,819	14,033	4,786	238,133
May	192,068	154,958	37,110	18,115	13,641	4,474	210,183
June	174,667	136,531	38,136	14,732	11,014	3,718	189,399
July	141,437	106,841	34,596	9,007	5,273	3,734	150,444
Aug.	90,484	58,624	31,860	6,452	3,063	3,389	96,936
Sept.	83,534	65,159	18,375	6,089	4,290	1,799	89,623

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]							NETHERLAND INDIES [4]						
	Gross Exports	Imports	Net Exports	Ceylon [2]	India & Burma [3]	Sarawak [3]	British North Borneo [3]	Siam [3]	Java & Madura	Sumatra E. Coast	Other N. I.	Indo-China [3]	Amazon Valley	All Other [5]	World Total [6]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	37,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	35,551	83,978	125,969	208,699	43,387	15,576	12,721	1,120,576
1937:															
May	51,152	17,350	33,802	4,607	1,007	742	778	2,238	7,530	8,939	20,835	2,888	1,063	1,010	85,439
June	54,809	23,614	31,195	5,149	1,092	1,890	813	2,933	8,269	12,290	24,804	3,673	762	945	93,815
July	71,863	26,100	45,763	6,279	966	2,543	1,414	3,175	7,512	11,557	23,520	5,563	854	1,416	110,562
Aug.	64,525	21,395	43,130	7,308	605	1,624	1,189	2,999	6,785	11,563	21,014	2,277	1,248	1,283	101,025
Sept.	67,414	19,065	48,349	5,804	1,092	2,659	969	3,173	6,402	10,862	19,611	4,131	1,007	1,145	105,204
Oct.	59,319	11,858	47,461	6,701	1,248	523	1,505	2,352	6,587	12,172	14,188	3,753	1,434	1,147	99,071
Nov.	57,850	12,396	45,454	4,391	2,135	2,517	1,327	2,549	6,310	10,003	11,596	4,556	963	1,037	92,838
Dec.	56,791	13,949	42,842	9,529	2,708	3,009	1,172	2,957	9,108	12,272	11,731	5,384	2,011	1,032	103,755
1938:															
Jan.	47,986	17,078	30,908	5,222	1,379	3,485	1,307	2,897	4,476	9,283	12,501	6,086	878	1,400*	79,822
Feb.	48,899	11,874	37,025	5,216	1,423	8	918	3,266	6,391	8,793	12,023	3,068	1,542	1,400*	81,056
Mar.	49,197	15,813	33,384	3,834	1,247	1,564	853	2,837	5,668	10,156	15,284	3,213	1,831	1,200*	80,209
Apr.	53,864	9,158	44,706	1,951	1,347	1,728	1,158	1,583	5,967	10,081	12,274	3,647	1,004	1,200*	86,644
May	38,245	10,325	27,920	2,833	1,283	1,648	815	2,507	4,575	7,515	9,741	3,118	1,053	1,200*	64,208
June	42,258	14,394	27,864	3,693	1,318	2,441	643	3,906	4,519	7,788	11,899	4,773	718	1,200*	70,762
July	43,689	18,713	24,976	3,861	1,083	2,057	937	4,707	6,808	8,271	19,765	5,136	625	1,200*	79,426
Aug.	47,246	13,735	33,511	4,401	953	965	728	4,793	4,757	7,329	10,912	3,838	700*	1,200*	74,087
Sept.	40,992	10,586	30,406	4,023	1,040	756	284	3,893	4,026	7,052	9,038	8,131	750*	1,200*	70,599
Oct.	42,294	16,599	25,695	4,837											

All figures from January, 1934, onward are net exports shown on a "dry rubber" basis as calculated by the International Rubber Regulation Committee. (1) Prior to January, 1934, Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex also is not included in the early years, which on a dry rubber basis was as follows: 1924—1,117 tons; 1925—3,618; 1926—3,263; 1927—2,439; 1928—2,247; 1929—3,574; 1930—2,750; 1931—1,940; 1932—5,193; 1933—10,470, and 1934—14,172 tons. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments on a dry rubber basis were: 1923—18 tons; 1924—90; 1925—6; 1926—20; 1927—½; 1928—1; 1929—2; 1930—11; 1931—2; 1932—2; 1933—1, and 1934—6 tons. (3) Official statistics. (4) Exports from "Other N. I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included in earlier years, which is as follows on a dry rubber basis: 1923—2,342 tons; 1924—1,008; 1925—2,239; 1926—44; 1927—84; 1928—1,395; 1929—437; 1930—2,744; 1931—3,874; 1932—3,488; 1933—5,260, and 1934—5,330 tons. (5) Calculated from official import statistics of principal consuming countries; also includes United States imports of guayule. (6) This total includes the third column for British Malaya and all other figures shown for other territories. (*) Figure is provisional.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	73	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,882	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,394	92,707	59,871	98,170	36,088	62,311	24,733	28,904	19,164	14,970	4,343	4,680	2,400	13,063	1,063,798
1937:															
May	48,506	6,100	5,558	6,706	4,187	8,596	2,772	1,886	1,290	2,113	361	1,576	200*	925	90,776
June	48,972	5,157	6,010	6,469	3,791	7,608	1,958	3,940	2,226	1,630	521	1,802	200*	1,150	91,434
July	43,018	10,628	4,306	7,860	1,946	4,851	2,719	2,150	1,902	851	497	1,409	200*	753	83,090
Aug.	49,485	15,757	4,488	8,752	3,506	4,409	2,569	1,226	2,153	1,013	382	1,386	200*	1,692	97,018
Sept.	56,685	15,671	4,820	10,595	2,396	3,666	1,941	1,391	3,184	1,258	337	1,648	200*	1,369	105,161
Oct.	52,926	11,899	4,278	8,076	5,998	2,059	951	2,500*	2,470	967	367	1,535	200*	988	95,214
Nov.	54,135	12,878	4,311	8,848	4,787	1,368	2,857	2,500*	1,935	925	313	970	200*	846	96,873
Dec.	69,660	10,655	5,736	9,580	2,619	1,995	1,976	2,500*	767	1,286	318	1,008	200*	1,890	110,190
1938:															
Jan.	45,596	15,458	4,769	6,314	1,789	4,935	1,857	2,693	574	1,257	300	1,239	200*	1,102	86,083
Feb.	40,977	16,505	5,456	6,959	615	3,173	2,053	2,341	578	974	534	1,114	200*	1,771	82,843
Mar.	42,075	15,911	4,845	10,768	2,123	6,222	1,365	2,162	1,043	961	342	1,088	200*	1,324	90,429
Apr.	31,870	14,653	5,757	6,497	999	5,456	2,397	4,281	640	904	449	971	200*	920	75,994
May	27,809	14,675	5,169	9,595	2,545	3,328	2,422	4,163	1,041	1,137	419	1,283	200*	957	74,743
June	26,429	14,053	4,542	7,460	3,243	2,145	2,399	505	805	853	663	1,149	200*	988	65,434
July	22,209	12,678	5,433	6,927	2,685	3,100	3,641	541	1,215	1,106	526	1,151	200*	635	62,047
Aug.	31,494	12,891	3,662	7,190	1,832	2,034	2,045	3,000*	1,182	1,238	259	965	200*	595	68,587
Sept.	34,436	8,100	5,094	7,390	1,405				854	514	385				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]—United States imports of guayule are included in this compilation. *—Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE: THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

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